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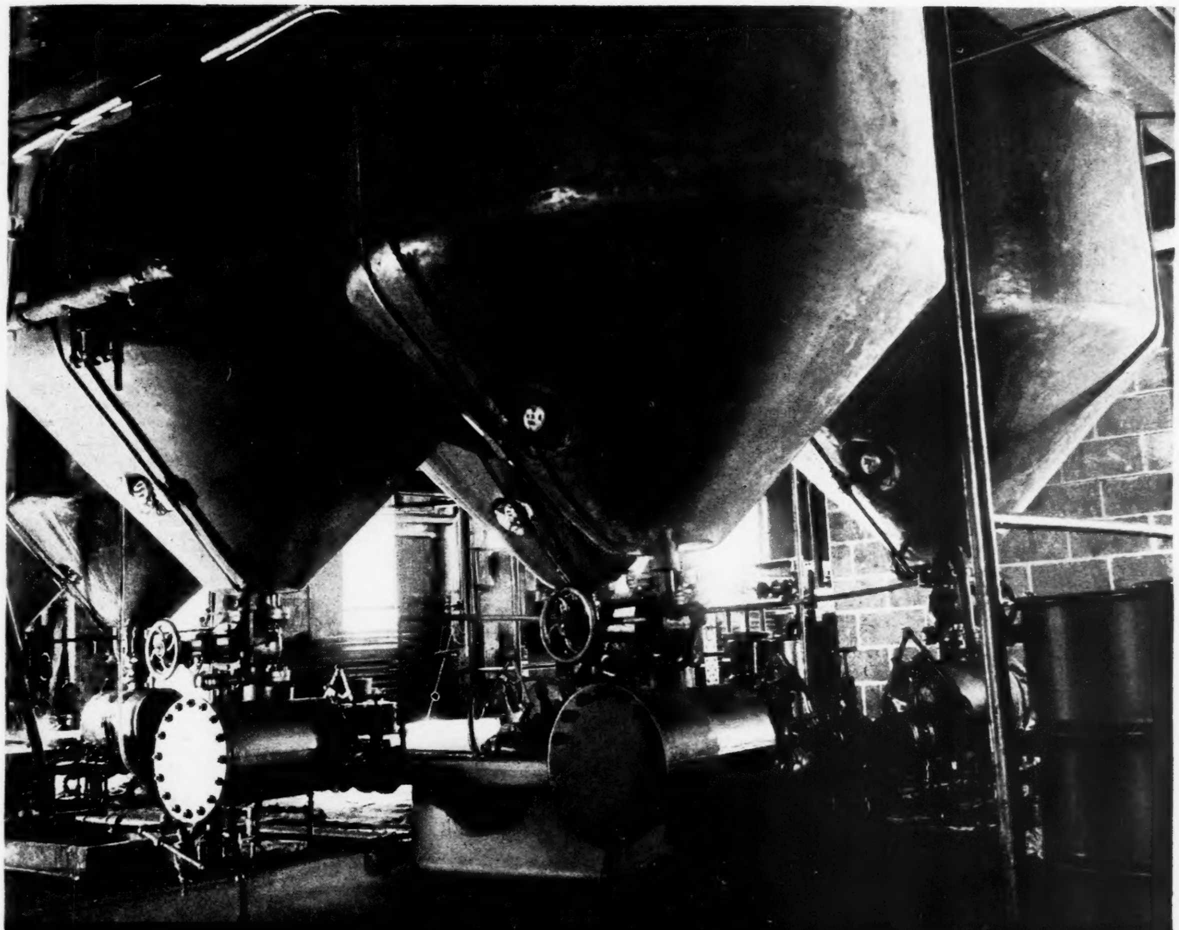
WITCO
Melvin Harris



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GRADE	TYPE	SYMBOL	SURFACE AREA m^2/GRAM	pH	PERCENT DPG ADSORPTION	USES
VOLTEX	CONDUCTING CHANNEL	CC	281	ACID	49	Electrically conducting rubber stocks; static dissipation.
KOSMOBILE-S DIXIEDENSED	HARD PROCESSING CHANNEL	HPC	105	ACID	14	For highest reinforcement and abrasion resistance; tire treads, wire jackets, tank treads, etc.
KOSMOBILE (S-66) DIXIEDENSED (S-66) KOSMOBILE (HM) DIXIEDENSED (HM)	MEDIUM PROCESSING CHANNEL	MPC	94	ACID	11	Standard rubber black for reinforcement, tear and abrasion resistance; tire treads, conveyor covers, soles, heels, molded goods, etc.
KOSMOBILE 77 DIXIEDENSED 77	EASY PROCESSING CHANNEL	EPC	82	ACID	10	Reinforcement of reclaimed and synthetic rubber; synthetic tire treads, synthetic soles and heels, and other GR-S stocks requiring high tensile and resistance to abrasion.
KOSMOS 40 DIXIE 40	HIGH MODULUS FURNACE	HMF	45	ALKALINE	2	Especially adapted for synthetic rubber, for ease of processing, low heat build-up, and resistance to flex cracking; synthetic tire treads, bogie wheels, etc.
KOSMOS 20 DIXIE 20	SEMI-REINFORCING FURNACE	SRF	29	ALKALINE	3	Mechanical goods, synthetic tire carcasses, boots, shoes, insulated wire, tubing, automotive goods, etc.

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For good friction stocks

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GRS	100
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Stearic Acid	2.5
EP Channel Black	40
Sulphur	2.5
TMTMS	1.75
GALEX	40

Cure: 25 minutes at 292° F. at 45 lbs.

Tensile	1800 lbs.
Elongation	780%
Modulus	300%—400 lbs.
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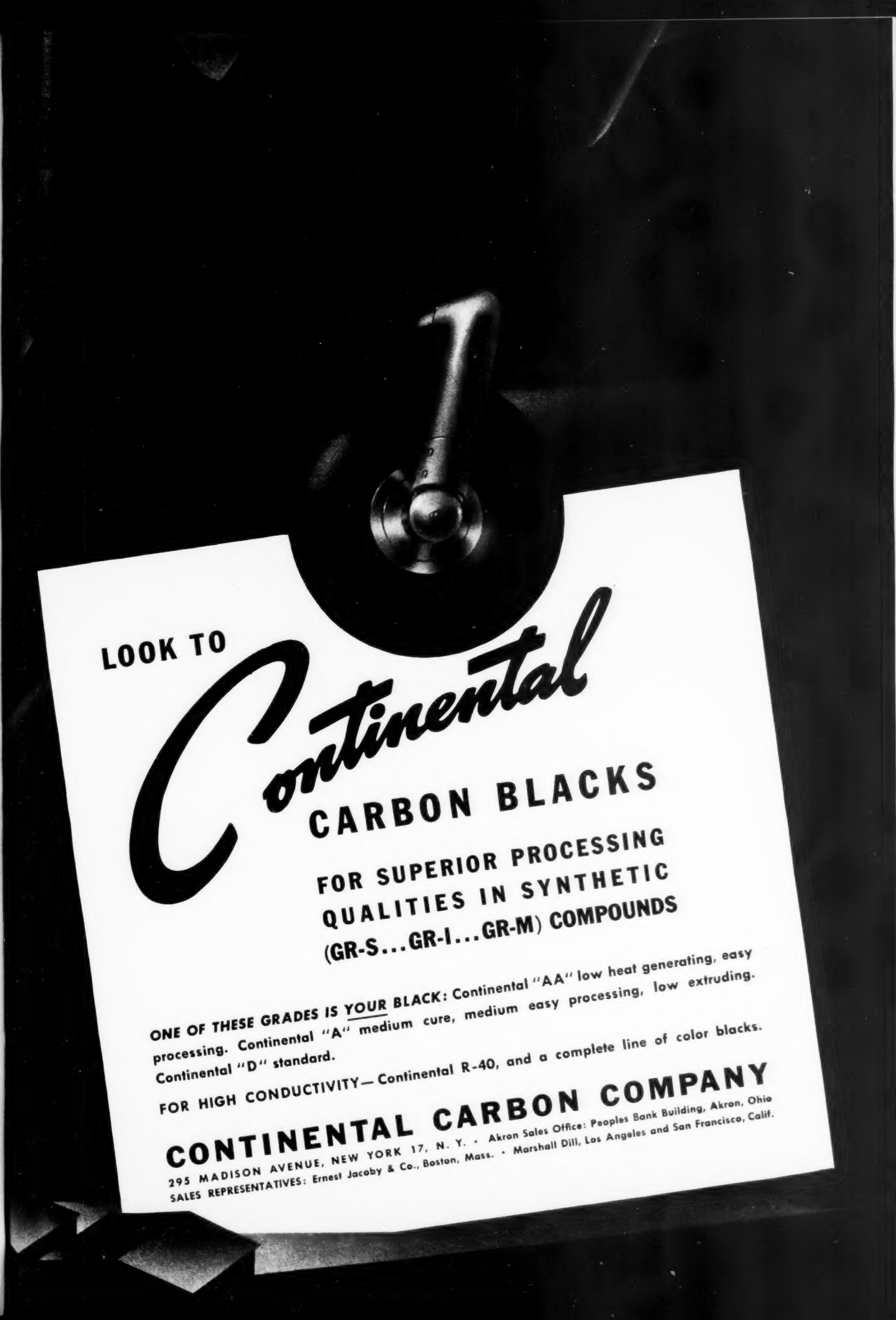
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February, 1944

VOLUME 109 NUMBER 5

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INDIA
RUBBER WORLD
NATURAL & SYNTHETIC

CONTENTS

DEPARTMENTS

MARKET REVIEWS

STATISTICS

ARTICLES

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INDIA

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NATURAL & SYNTHETIC

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Ordnance Keeps 'Em Rolling—I[1]

What Fleet Men May Learn from Army Tests of Synthetic Tires . . .

Lt. Col. B. J. Lemon[2]
and Capt. J. J. Robson[2]

THIS excellent factual summary of the results to date in the development of GR-S synthetic rubber tires for military use, as carried out since January, 1942, by U. S. Army Ordnance and the rubber industry under the direction of Col. J. M. Colby, chief of the Development Branch, Detroit, Mich., does draw a distinction between the service required by Army tires, which must be capable of cross-country maneuver, and the highway service of tires used in commercial transport. Although it is stated that variations in Army and commercial vehicle design and tire requirements are recognized and considered in the conclusions drawn as to what operators of trucking fleets may learn from Army tests on synthetic rubber tires, it cannot be emphasized too much that while in the small-size tires the Army is satisfied with mileages of 10,000 to 15,000 on surfaces and under heat conditions admittedly worse than those usually met with in commercial work, fleet operators of passenger cars and light trucks are mostly interested in much higher mileage on reasonably good road surfaces, where tread wear, not so important in Army tests, also becomes an important factor. Of even greater importance to fleet operators is the fact that in the medium-size truck tires, the best results to date indicate mileages of about 15,000 *if these tires are not overloaded.* As stated in the Conclusions of this article, *they will not stand severe overloading or sustained high speeds, and this will be forcefully driven home to some operators by epidemics of heat blowouts.*

An important contribution of this article is the confidence expressed by the Army in synthetic rubber tires and the publication of its actual test results in order to help dispel some of the doubts expressed by fleet operators about these synthetic rubber tires which they will be using in increasingly greater numbers in 1944.

THE Army maintained consistently that of all the strategic materials, rubber was the one which presented the greatest possible threat to the safety of our nation, from the standpoints of military and commercial transportation. That threat materialized three months after our entry into the war when decisive enemy action cut off 90% of the world's prewar rubber sources.

The events, following this loss of 7,000,000 plantation acres of Far Eastern rubber, are too well known to require more than a passing summary. We had on hand a fair sized crude rubber stockpile, supplemented by better than a million tons of rubber on wheels, and a moderate, but belated synthetic production program. The Baruch Committee made an estimate of the situation, as to the necessity of conserving natural rubber, the possibility of getting rubber from Latin America, and the merits of the types and processes for synthetic rubber, and laid down a broad program designed to see the nation through the threatened rubber crisis. The Office of Rubber Director and the chemical, petroleum, alcohol, and rubber industries rapidly and accurately carried out the program and accomplished the seemingly impossible in producing nearly enough synthetic on time to meet essential needs.

Army-Industry Liaison

In fighting a war there is little time to analyze the rush of events or to appraise their consequences beyond the war's end. The united objective is rightly the success of our arms. Yet under the exigent demands of a great war there are compressed scientific and industrial developments that would have taken a decade of peace to achieve. This is true of the development of the synthetic tire.

The emergencies of a great conflict often require new or greatly enlarged agencies and personnel to deal with the emergencies. Frequently peacetime organizations are not adequate in administration or personnel to handle war crises. Men with capabilities of making sound emergency decisions are generally too busy and too active to accept leadership and remain fixed in slower moving peacetime

[1] Presented before the 1944 annual meeting of the Society of Automotive Engineers, Detroit, Mich., Jan. 10, 1944. All photographs through the courtesy of Ordnance Test Command, U. S. Army.
[2] Development Branch, U. S. Army Ordnance, Detroit, Mich.

organizations. The rubber crisis called for capable men, and fortunately Ordnance got them.

The overnight requirement of a synthetic tire called for quick action and was rightly classed as one of the major emergencies. Tire men from past practice knew of no way to convert natural rubber tires to synthetic tires but by the painstaking process of build and test. The change could be made only in progressive steps, from all rubber to varying amounts of rubber and synthetic and finally, where possible, to all synthetic. Past experience indicated that the larger the tire, and the more severe the service, the more difficult the problem would become. Therefore indispensable facts must be developed, organized, and interpreted into physical products.

There was available too small a supply of synthetic for a score of companies to start separate programs. Besides industry possessed none of the Army vehicles on which to test the military product. It was clear to both the Army and to the rubber industry that a joint program of tire research, development, and testing must be launched which in its requirements of funds, of equipment and facilities and of experience and know-how would go far beyond any program ever before attempted.

So the Army and the industry pooled their resources and did it without stifling Army or company or individual initiative. The Army furnished the requirements of test vehicles, proving grounds, operating personnel and procured the experimental tires. The industry provided the laboratory test facilities, supplied the experts in research, development, compounding, and processing, as well as the experienced field personnel to follow the controlled proving ground tests, and the uncontrolled field tests, and built the tires, tubes, and flaps.

Direct working Ordnance-rubber industry liaison was set up which functioned through committees made up of the industry's leading tire technicians and coordinated by Army and civilian personnel with long and varied rubber experience. Committee administration was furthered by the unselfish help of the Society of Automotive Engineers and The Tire & Rim Association, Inc.

Early in the Development Branch program, Major General G. M. Barnes, chief, Technical Division, of Ordnance, addressing a joint meeting of rubber experts stated:

"There are a large number of rubber research and development problems that now need solution. They are pressing. We need the help of the rubber industry of this country. I want to be sure that industry will furnish the most capable technical representatives so that Ordnance can have advice of the highest authority on these complicated technical problems. The work that they will originate will result in the expenditure of millions of dollars of public funds.

"To get the best product for the Army, it will be necessary that companies give up data developed at high cost so that industry as a whole may produce uniform and adequate synthetic products. This means not partial, but complete pooling of information all along the line. We expect and believe that the rubber industry will meet the challenge of these difficult problems and will solve them."

The rubber companies accepted this challenge. They furnished their experts and pooled their secret information—not with a feeling of coercion or even of dignified acquiescence, but with the heartiest sort of cooperation and unity of purpose.

GR-S Synthetic Rubber in Tires

In spite of a tremendous amount of scientific and practical work, no one, so far as known, has succeeded in producing an exact duplicate of natural rubber by chemical synthesis. Therefore the use of the term synthetic rubber is scientifically incorrect. However since certain synthetic materials have many physical properties of natural rubber, the term "synthetic rubber" has come to be accepted through common usage.

In its general capacity to do work, natural rubber is superior to synthetic in most performance characteristics. On the other hand synthetic rubbers are superior to natural rubber in resistance to most deteriorating influences, such as swelling by gasoline and mineral oils and impairment by ozone and sunlight. These special characteristics guided the prewar limited production of synthetics into specialized fields.

From the pneumatic tire standpoint, discussion will be confined principally to the one synthetic rubber at present in greatest production: namely, GR-S. The letters GR-S stand for "Government Rubber-Styrene", sometimes referred to as domestic Buna S. The term Buna S is the German designation for a similar but not identical synthetic rubber which we call GR-S and which is made by copolymerizing butadiene and styrene. Both of these chemical ingredients or monomers must be made synthetically or derived from related materials. GR-S was chosen as our principal mass-production synthetic rubber

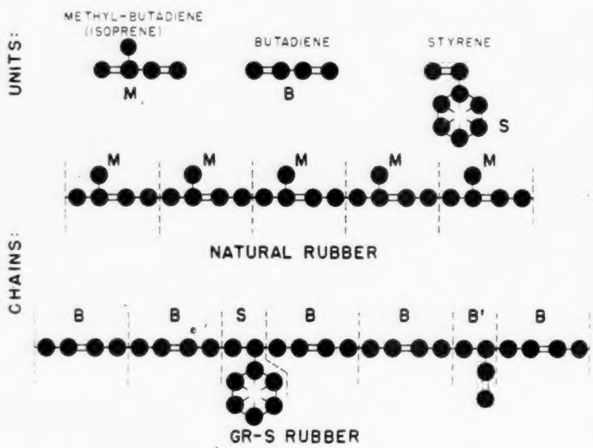


Fig. 1. Showing Units Making up the Chain Molecules of Natural and GR-S Rubbers and Comparing the Structural Formations of the Two Chains Made up of Each Unit (Black Dots Represent Carbon Atoms)

on the basis of its general characteristics and its economical production cost. The raw materials commonly used to produce it are petroleum or ethyl alcohol for butadiene and coal tar or petroleum for styrene.

The differences in the fundamental properties of natural rubber and GR-S appear to be due to variations in molecular structures; the arrangements of the atoms in the molecules control such valuable working properties as elasticity and strength.

If we represent in Figure 1 a greatly simplified picture of chain molecules of GR-S and rubber, GR-S appears to have less uniform molecular chain structure than does natural rubber, with the styrene inserted irregularly along the synthetic chain between the butadiene units. In natural rubber the links are alike; in GR-S there are two kinds of links. In natural rubber the chains are continuous without branching; in GR-S we are told by the chemists that side branching occurs. The GR-S chains have a less regular and a less flexible structure and are prone to break at lower elongations.

Some of the deficiencies of a GR-S tire compared with one of natural rubber are: develops higher flexing heat; loses stretchability when hot, causing greater cracking

and chipping; has low tear resistance at higher temperatures; sticks to itself poorly, before vulcanization; requires more time and power to mill.

Much has been done to improve the undesirable characteristics of GR-S by the use of reenforcing substances. For example, in tires GR-S does not have good physical properties unless mixed with carbon black. Progress made by Ordnance and industry in overcoming shortcomings of GR-S in tires will be discussed under test results farther along in this paper.

Purpose and Authority for Army Tests

The Army tire development and testing program was initiated to save natural rubber and to convert to synthetic rubber as fast as synthetic became available, maintaining adequate military requirements in both the natural and synthetic rubber products.

On January 6, 1942, Under Secretary of War Robert P. Patterson, issued the following directive to Major General L. H. Campbell, Jr., the Chief of Ordnance: "The outbreak of hostilities in the Pacific intensified the problem of synthetic rubber production. Accordingly, your branch of the service is authorized to purchase and test such semi-synthetic tires and tank tracks as it deems advisable."

Fig. 2. Cross-Country Course, Camp Seeley, Calif.

Scope of Testing

A program was drawn up authorizing the four major rubber companies to produce several hundred thousand synthetic tires, to be built with from 80 to 100% synthetic in the tread and sidewall, but with natural rubber carcass, for unrestricted service in Army field organizations in the United States. A comprehensive controlled laboratory test program was prepared covering rubber industry and Bureau of Standards tests, Army controlled highway and cross-country tests, and uncontrolled Army field service tests, in order to get conclusive factual data and experience as to synthetic tire performance and durability.

In March, 1942, the Army Desert Test Command was established at Camp Seeley, El Centro, Southern California, for the purpose of evaluating the performance of tires under high atmosphere temperature conditions, as well as to study tire flotation and traction in sand. Figure 2 shows one of the types of terrain around Camp Seeley. Lt. Col. J. E. Engler, who established the Desert Proving Ground and has continued in command, has shown unusual ability, resourcefulness, and efficiency in carrying out the testing operations. The operating personnel is generally military except for resident technical advisers furnished by the various rubber companies. Tests at this California Desert Proving Ground magnify tire failures caused by heat separation.

The Ordnance Normoyle Tire Test Fleet, based at San Antonio, Tex., was established to satisfy controlled tire and tube test requirements for trucks designed for military service, covering hard surface and gravel roads and cross-country operation. Figure 3 illustrates the nature of the cross-country course in Texas. The 165-mile test route is made up of 70% hard surface highway, 15% gravel, and 15% cross-country trails. The Army trucks operate 24 hours a day, 7 days a week, with an average total weekly vehicle mileage of approximately 270,000. The test facilities are open to all tire and tube companies, and all such companies who submit products for test may send company observers to follow their products and to receive reports. The Normoyle test is managed efficiently under Development Branch, Ordnance Department Contract, by S. R. Filer, of the Firestone Tire & Rubber Co., with an operating personnel of about 750. Tests at this Texas Proving Ground provide operation under conditions of high average year-around temperatures.

Canada, with a parallel problem of using synthetics, is running a sizable fleet of its own special military trucks

Fig. 3. Normoyle Course, Texas

and tire sizes as an integral part of the Normoyle Tire Test Fleet.

During the past summer, another Ordnance controlled tire test was operated out of Aberdeen Proving Ground to supplement the test results of the California Desert and the Texas courses under the more moderate temperature conditions of Maryland.

Last winter Ordnance ran controlled winter tests at Shilo, Man., Canada, to determine the effect of extreme low temperatures on natural and synthetic rubber products, where temperatures ranged as low as −45° F. Similar tests are running elsewhere this winter.

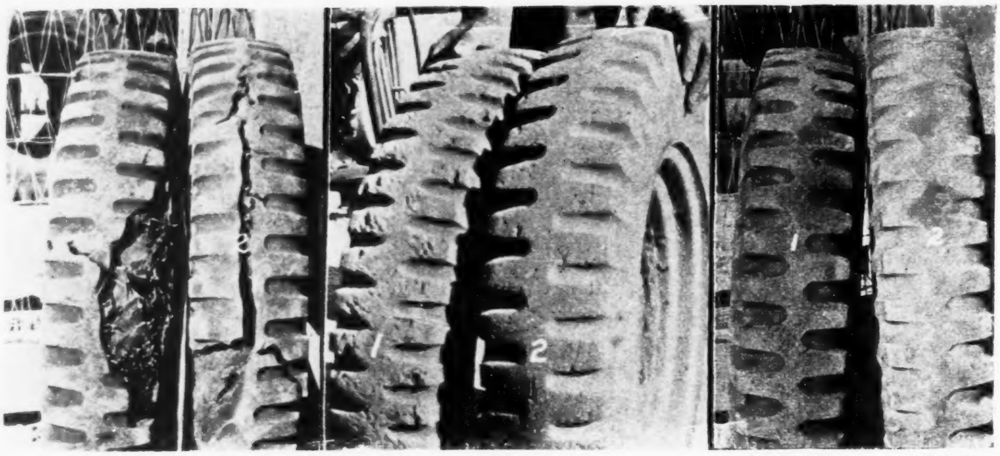
Special controlled tire tests are intermittently run by the various Army Service Boards in different parts of the United States.

Finally, uncontrolled field service tire tests by the troops of the using Arms and Services provide a continuing check on rubber and synthetic tire and tube performance.

These tire testing operations are believed to be the most extensive of their kind ever attempted anywhere—either by a military or an industral group.

Army *versus* Commercial Tires

From the start of the testing program, a necessary dis-



13,422 Miles 12,856 Miles 14,623 Miles 14,665 Miles 14,347 Miles 15,000 Miles

Fig. 4. 6.00-16 100% Synthetic Tires (Original "S-3" Tires) Tested at Camp Seeley; Course: 10% Gravel for 10,000 Miles at 50 M.P.H. on Pavement, 40% Gravel for Remainder at Less Miles per Hour

13,266 Miles Bruise Failure 13,377 Miles 10,650 Miles Bruise Failure 9,730 Miles Bruise Failure

Fig. 5. 6.00-16 100% Synthetic Tires at Normoyle; Course: 70% Highway, 15% Gravel, 15% Cross Country

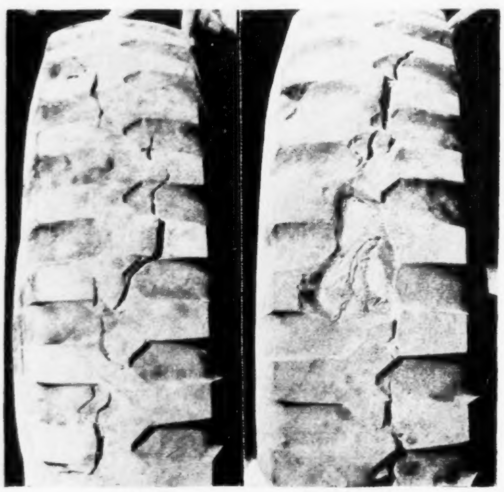
tinction was drawn between the service required of Army tires, which must be capable of cross-country maneuver and the highway service of tires in commercial transport.

Pneumatic truck tires, in commercial transportation service generally roll over hard surfaced, well-maintained highways to unbelievable mileages, with tread life including recapping the determining factor in length of service. The same-size tires on military vehicles in combat area service or even on poorly maintained roads in communication zones, adjacent to combat, have, at best, minimum service expectancy and go out of service generally from carcass failures.

At the beginning of the Ordnance tire testing program, many experienced commercial tire testing engineers unfamiliar with Army tire requirements hesitated in approving as practicable the rugged, cross-country type of maneuver area selected by the Army for tire tests. However concurrent experiences in large-scale domestic Army training maneuvers as well as subsequent return of tires from war theatres proved to all concerned that the inclusion in the Normoyle Tire Test Course of a percentage of rough cross-country routes was absolutely essential to the development of an adequate military tire, as well as an adequate military vehicle.

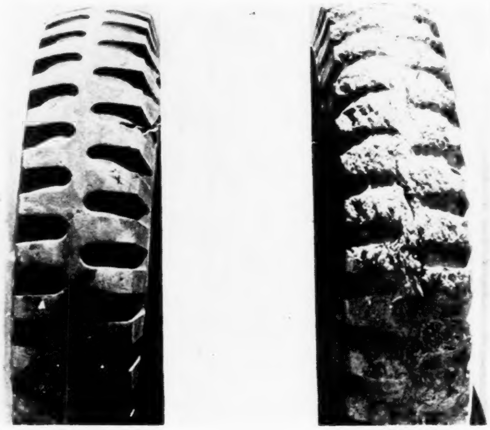
Army tires have what we call a mud and snow tread pattern. This is an aggressive tread, designed to give good traction in soft going, with reasonable wear on pavement. This Army tread differs from that of road transportation tires, which are known as highway type, and are primarily designed for maximum wear with traction secondary.

Another important difference between Army and commercial tire requirements is reflected in the design of Army trucks where dual rear tires on multi-rear axle vehicles are purposely oversized or underloaded, first to provide greater flotation, second to furnish a safety factor from tire bruising during cross-country operation, and third to take care of a certain amount of uncontrollable overloading in combat areas. On the other hand the front tires of Army all-wheel drive vehicles using dual rear tires carry capacity loads—again differing somewhat from commercial practice. Also, if operating in convoy, in blackout, or cross-country, Army trucks move at slower speeds than highway commercial transportation. These variations in Army and commercial vehicle design and tire requirements are recognized and considered in the conclusions to be drawn as to what the fleet men may learn from Army



3,331 Miles 3,331 Miles

Fig. 6. 9.00-20 Synthetic Tread Tires; Course: 10% Gravel, 30 M.P.H.; 4,200-Pound Load



Natural
3,198 Miles

Synthetic
2,730 Miles

Fig. 7. Comparison of Natural-Tread and Synthetic-Tread 7.50-20 Tires at Normoyle; Course: 70% Highway, 15% Gravel, 15% Cross Country; Load, 2,700 Pounds

tests of synthetic tires.

In the nick of time, when the Army synthetic tire pressed for solution, an officer was ready with the right qualifications to tackle the job. He is Capt. J. J. Robson, who has carried out in a superior manner the development and testing program of the Army synthetic pneumatic tire. In the remainder of the paper Captain Robson will describe the detailed results of the work that has been done.

Ordnance tires are roughly divided into these groups:

Group	Sizes	Vehicles
Small tires	6.00 through 7.00 (8-ply)	Passenger and light trucks
Medium tires	7.00-10-ply through 10.00	¾-ton through six-ton trucks
Large tires	11.00 through 14.00; also large earthmover	Large trucks, 10-ton, etc., tank transporters, etc.

Synthetic rubber has presented increasingly difficult problems in each of these groups, and separate consideration is given to each group in order to avoid confusion.

Results with Small Tires

The small-tire group in the Army is largely devoted to the 6.00-16 tires for the ¼-ton 4x4 truck, known as the jeep. The first tests run were synthetic treads on natural rubber carcasses, which showed such promising results that tests were next conducted on 100% synthetic tread and carcass construction.

Shown in Figure 4 are the results of test of the first of these tires at Camp Seeley, operating at 50 m.p.h. sustained speed, at atmospheric temperatures up to 115° F. These were run 10,000 miles on our standard course, then shifted to a 40% gravel course. It will be noted that the tires show a few failures, after 13,000 to 15,000 miles, which is a very good record for such severe conditions.

Also shown in Figure 5 are the same 100% synthetic tires tested at Normoyle, operating on the highway at 55 m.p.h., and on severe cross-country at reduced speeds. Here again, they look very good.

These tests, together with numerous rechecks, proved conclusively that 100% synthetic tires are successful in smaller tire sizes. Later a qualifying test was established at Camp Seeley, which required that the tires run 5,000 miles without heat failures. Twenty-four companies supplying this size have passed this test, with most groups running 10,000 miles without failure.

Since February of 1943, when synthetic rubber started to come into limited production, small tires have been 100% synthetic. They are doing an outstanding job, as is certified to by the following comment from D. G. Roos, of Willys-Overland Motors, Inc., on a test his company

(Continued on page 472)

Fig. 9. Section of the Alaska Highway

7,482 Miles Bruise Failure | 18,127 Miles | 18,274 Miles | 20,535 Miles | 6,694 Miles Bruise Failure

Fig. 8. 7.50-20 90% Synthetic Tires at Normoyle; Course: 70% Highway, 15% Gravel, 15% Cross Country

Fig. 10.
German
Synthetic Tire

Advances in Plastics during 1943[1]

G. M. Kline[2]

THE chronology of plastics progress during 1943 is wholly associated with the demands of total war. Plastics have assumed jobs in this National Emergency which stand in amazing contrast to their former peacetime roles. The versatility and potentialities of these synthetic materials have become even more evident in these wartime applications. The new materials and techniques which have been developed to meet the exigencies of the hour are far-reaching in their possibilities for influencing postwar utilization of plastics.

Materials

The safeguards of censorship have prevented extensive descriptions of many of the wartime arrivals in the materials field. Because these pioneering efforts constitute an interesting and significant phase of developments during this period of vigorous plastics activity, a brief survey of some of these newcomers is presented.

Synthetic replacements for natural mica—one of the most critical war materials because it is a vital component of radio and electrical apparatus—are being developed by several companies. One of these has produced a series of commercial products called Polectron (1).[3] Polectron is said to have an unusual combination of low dielectric loss, high temperature stability, and superior water resistance, although the mechanical strength of the resin as now made is still relatively poor. Immediate uses for the material, such as dielectric sheets in condensers, do not call for a high degree of mechanical strength.

An inorganic mineral element, silicon, has been combined with organic radicals composed of carbon and hydrogen to produce a new group of plastics called Silicones (2). Silicones are said to be resistant to temperatures as high as 500° F., which suggests their suitability for use in electrical insulation where such conditions may be encountered.

Another new material, as yet a little-known name on the plastics roster, is Penacolite. This is said to be a phenolic-type thermosetting resin which cures rapidly at temperatures from 60° to 150° F. under nearly neutral conditions. This type of resin may eliminate many of the difficulties in assembly gluing of wood or plastic-plywood parts for use continuously exposed to the weather.

Polystyrene has fulfilled many difficult assignments in wartime electronic and aircraft equipment (3). Styraloy (4), a recently developed elastomeric sytrene derivative, is reported to have properties which make it eminently suitable for electrical applications at both high and low temperatures.

A long-awaited entry in the plastics field is an adhesive which will permit the bonding together of metal, wood, plastics, ceramics, fibers, and rubber in any desired combination. A possible solution to this problem has been found in Cycleweld and Reanite cements, thermosetting plastics which are applied to the surfaces of the units to be bonded and then cured under heat and pressure. This process (5) is said to form structures which are stronger, lighter, and cheaper than those joined by conventional methods.

Reenforced plastics which permit large volume production of low-cost, lightweight, high-strength structures offer many advantages beyond the replacement of critical aluminum and magnesium. Several new resins (6, 7) which will form satisfactory bonds at low or contact pressures and thus eliminate the need of costly dies have been created, and special papers, cotton (8) and rayon fabrics, and glass fiber cloths (9) have been developed as reenforcing materials. These low-pressure laminated plastics attract interest because they make possible the fabrication of huge structures heretofore considered impractical and even impossible for plastics.

Resin-impregnated wood has become an important factor in maintaining an adequate supply of propellers for our expanding air forces. A plant with facilities for producing fifty times the volume of Pregwood available prior to the war is now in operation. The resin-impregnated and compressed maple boards are bonded by means of electrostatic high-frequency heating of thermosetting phenolic glues into blocks from which the propeller is carved. Other applications of this wood-plastic material include electrical insulation, bearing plates, skis, and ventilating fans (10-14).

A new rubber-like product, Paracon, made by the condensation of dibasic acids with glycols or by the condensation of hydroxy acids was announced (15). The elongation at break of these polyesters is said to average 400% with an average tensile strength of about 1,700 p.s.i. Important progress was also made in the production and application of polyethylene and its derivatives, but the publications on this subject were limited to the patent literature (16-17).

Significant reports were published concerning materials which are relatively new to the industry and which have been allocated practically completely to war uses. These pertained to the processing and properties of nylon (18-20), vinylidene chloride (21-23), and vinyl chloride-acetate plastics (24-27). The development of an improved heat-resistant methacrylate molding compound was announced (28). A low-density cellophane product which has some unusual properties and applications was described (29). Other noteworthy papers dealt with phenolic pulp preforms (30), plastics from redwoods (31-32), soybean-modified phenolic molding compounds (33), and starch plastics (34).

Molding and Fabricating

There have been a number of notable advances in molding and fabricating techniques during 1943. These have served to extend greatly the horizons of the plastics industry. Low-pressure laminating, post-forming of laminates, and heatronic molding have passed rapidly through their experimental stages to become new and vital tools in the production of plastic parts for our Armed Forces.

After several years of intensive research it is now possible to mold laminated structures at low pressures and at reduced temperatures with a consequent reduction in molding costs. The new technique also removes the size limitations which presses and steel molds had placed upon molded plastics applications and makes possible the economical production of small numbers of parts, the former insurmountable obstacle to many potential users of plastics. The molds for low-pressure molding can be fashioned from wood, cement, plaster of Paris, or cast metal. A rubber bag inserted into the cavity or a rubber blanket laid over

[1] Presented before the Rubber & Plastics Group, American Society of Mechanical Engineers, Hotel Pennsylvania, New York, N. Y., Dec. 2, 1943.
[2] National Bureau of Standards, Washington, D. C.
[3] Bibliography references are listed at the end of this article.

the mold and clamped tightly at the edges provides the means for applying uniform pressure to the closed mold by means of air, water, or steam. The low-pressure laminates compare favorably mechanically with high-pressure laminates and possess the additional advantage of permitting the formation of complex shapes without rupture of the fibrous reenforcing materials (35, 36).

Post-forming of thermosetting materials had its origin in the aircraft industry. Many intricate machines have been devised to make metal sheets take the complex shapes required by that industry. With this background of experience in handling sheet metals, it is not surprising that this same industry was the first to apply successfully sheet forming methods to plastic laminates to produce a wide variety of parts used on aircraft. Again, the important factors in its present and future uses are the ability to produce a few parts with negligible mold costs, the low pressures involved which make unnecessary costly investments in presses and auxiliary equipment, and the simplicity of the operation which is not dependent upon the use of skilled labor. The process consists essentially of subjecting the material to a temperature at which it becomes thermoplastic and quickly forming it over molds made of wood or other suitable materials (37-39). The surprising feature is, of course, the residual thermoplasticity retained by these thermosetting laminates which by definition were "infusible."

Electrostatic high-frequency heating was first applied in the plastics field to the curing of resins used in the bonding of plywood and the manufacture of high-density resin-impregnated wood (40). During 1943 this electronic method of heating was adapted to the molding of thermosetting materials. Called "heatronic molding," the process, as applied to compression molding, consists in heating the powdered or preformed material to molding temperature in the electrostatic field outside of the molding press, followed by a quick transfer to the mold and rapid closing of the press to obtain flow prior to hardening (41-44). The advantages of heatronic molding are ready molding of impact grades of materials, shorter cycles, lower pressures, less abrasion of the molds, less pin-breakage and displacement of inserts, and adaptability to molding of thick cross-sections.

Other developments and improvements in molding processes and fabrication techniques were described in the literature during the course of the year. Transfer molding (45-46) and mold design (47) were reviewed, and a comprehensive survey of molding tolerances (48-49) was made. Recommendations were published concerning good practices in the machining of laminates (50-51). Another application of electronics to plastics problems was achieved in the sealing of packages made up of thermoplastic film by passing the lapped material through a high-frequency electrostatic field (52).

Applications

A recounting of new uses of plastics during 1943 is necessarily another chapter in the story of meeting war materiel needs with these synthetic products. Plastics are used by our Armed Forces in every sphere of the war. It is noteworthy, however, that there were nearly twice as many reports published on aircraft applications of plastics as on all other war uses. This evidence of interest and activity in plastics on the part of the high-priority aircraft industry augurs well for a continuing and expanding market for these materials in that field. This contact has been a fortunate one for the plastics industry in that it has led to the development of methods for utilizing plastics for the manufacture of relatively small numbers of parts of moderately large size as compared with prewar emphasis on mass production of small shapes. It has also brought a demand for engineering data pertaining to the properties of these materials in order to use them most effectively in structural and semi-structural parts. The accumulation of these technical data during the war period will pave the way for broader industrial postwar applications of plastics.

Several reviews concerning the utilization of plastics for aircraft purposes were published (53-58). Other reports described specific applications, such as propellers (59), windshields (60-63), ammunition boxes (64), gun turrets (65), engine parts (66-68), antenna masts (69), jettison tanks (70), barrage baloon valves (71), speed indicators (72), bomb racks (73), and miscellaneous fittings, fairings, doors, and wing and tail parts (74-75). Plastics were used in drop-hammer and hydraulic press punches for forming metal sheets into aircraft components (76-78).

A commendable job has been done by the National Aircraft Standards Committee in the standardization of plastic tubing and tube fittings for use on aircraft (79). This reduction in the number of sizes and shapes of parts makes the use of plastics feasible and economical and simplifies inventory and servicing problems. A comprehensive survey of the activities of various technical committees with respect to research, specifications, standardization, and publications was issued, following a meeting held in Washington to coordinate such work, particularly in its aircraft phases (80).

Many developments in the use of resin-bonded plywood for aircraft construction were reported during the year. This triple alliance of the aircraft, plastics, and wood industries has resulted in the transformation of an old material into a versatile product adaptable to the methods and needs of modern industry. Further progress in improving the properties of plywood and extending its markets is to be expected from the current activity in the synthesis of new resins which will produce satisfactory bonds at very low pressures and room temperatures under practically neutral conditions.

The construction of airplanes from plywood was discussed in several papers published during 1943 (81-88). Special problems involved in molding monocoque structures from sandwich materials comprising high-strength facing sheets bonded to low-density cores were reviewed (88-89). The use of resin-bonded plywood for seaplane floats (90), refrigerator cars (91), and tubular antenna masts (97) was reported.

Advances in synthetic resin glues (93-96) and in bonding and forming techniques (97-99) were described. Problems involved in formulating and evaluating finishes for plywood were analyzed (100). The behavior of plywood under various stress conditions (101-102) and in delamination tests (103) was reported.

A variety of items developed or made during 1943 from plastics for the Armed Forces was described (104-107). Special articles considered in detail such applications as fuzes (108), bomb recorded frames (109), gas mask parts (110), snake bite kits (111), canteens (112), helmet liners (113), insignia (114-115), hand grenades (116), foot tubs (117), handwheels (118), training bayonets (119), "walkie-talkie" microphones (120), bugles (121), tank periscopes (122), ship propeller bearings (123), and binocular carrying cases (124). Excellent surveys of the manifold and large-scale utilization of plastic-coated fabrics for the fabrication of various types of military equipment were published (125). The use of resinous coatings for protecting steel shell cases against corrosion (126) and for other military requirements was reviewed (127).

The non-military applications of plastics during 1943 were restricted to essential civilian and industrial requirements. Many of these represented replacements for materials such as rubber, leather, and copper, the supplies of

which were even more critical than that of plastics. Polyvinylidene chloride was used as piping (128-131), screening, and moistureproof packaging material (22-23), (132-133). The vinyl resins were employed extensively as flexible electrical insulation (134) and in soles for shoes (135). The ion-exchange resins were utilized in many industrial processes for purification of water (136-137).

Reviews were published discussing the uses of plastics in adhesives (138-139), medical supplies (140), printing plates (141-142), synthetic textile fibers (143), railway equipment (144-146), and building construction (147-149). Significant developments in improving the optical properties and extending the optical applications of plastics were described (150-153). Large tonnages of these synthetic materials were used in protective coatings; advances in this field were discussed in several papers (154-157).

Properties, Testing, Specifications

A record number of papers describing the results of experimental work on various properties of plastics was published during 1943. These marked a continuation of efforts to supply the military services with the engineering data required for proper use of plastics in their war applications. Such publications are providing a foundation of technical information upon which the plastics industry can build diverse and substantial markets in new fields after the war.

The American Society of Mechanical Engineers through its Rubber and Plastics Group sponsored many of these technical papers. Reports on investigations of the bearing strength of plastics (158) and their behavior under sustained vibrations (159) were published by the Society. The effects of continuous heat on phenolic materials (160) and various mechanical properties of cellulose acetate (161) were described in other A. S. M. E. papers. Three papers on plastics were presented at the semi-annual meeting in Los Angeles in June; these pertained to thermoelastic forming of airplane parts (39), properties of Fiberglas laminates (162), and a discussion of laminates made by combinations of wood with cloth and paper (163). The annual meeting of the Society in New York in December was marked by six further contributions to the fund of information on plastics. These reports concerned paper-base laminates (164), tubings and fittings for aircraft (165), fatigue behavior of resin-bonded plywood (166), creep properties of phenolic plastics (167), printing plates (168), and application of plastic films and solutions to glass to prevent scattering during air raids (169).

Three outstanding papers on the strength characteristics and testing of plastics were presented at the annual meeting of the American Society for Testing Materials in June. These related to impact testing (170) flow of plastics under load (171), and correlation between impact and fatigue tests (172).

An important symposium on the engineering properties of plastics from the viewpoint of their application to aircraft components was held during February under the sponsorship of the Army-Navy-Civil Technical Subcommittee on Plastics. Three papers giving detailed information regarding the mechanical strength of laminates were presented (57, 173, 174). Other reports describing experimental work conducted by the Army Air Forces and Naval Air Experimental Center on plastics were published during the year (175-177).

Several papers described investigations of the physical properties of the increasingly important group of elastic plastics; these were concerned with their fatigue resistance (178), abrasion resistance (179), stress-strain characteristics (180), and low-temperature brittleness (181). Studies of the behavior of urea-formaldehyde molding compounds under various curing and conditioning treatments were reported (182, 183). Chemical (184) and physical (185) properties of laminates were discussed. A review of the strength and optical qualities of cast methyl methacrylate sheet plastic was published (186). Other topics considered by various authors included mechanical strength at low temperatures (187). Ignition points (188), electrical properties (189), and toughness (190).

Three noteworthy guides to identification of plastics appeared in the literature during 1943. Two of these pertained to resins used in commercial molding compounds (191, 192), and the third was concerned with plywood glues (193).

Committee D-20 on Plastics of the American Society for Testing Materials completed action on a record number of testing methods and specifications for plastics. Six new tentative methods of test were adopted, and six others were advanced to the status of standard methods. Sixteen specifications for plastic materials were prepared by Committee D-20 and approved by the Society during the year. These covered phenolic, urea, melamine, styrene, vinyl chloride-acetate, vinylidene chloride, cellulose acetate, and cellulose acetate butyrate molding compounds; cellulose nitrate, cast methacrylate, vinyl chloride-acetate, and laminated thermosetting sheets, rods, and tubes; and non-rigid vinyl chloride, vinyl chloride-acetate, vinyl butyral and ethyl cellulose plastics. Development of many other testing methods and specifications was undertaken by this committee during the year.

Books

This review of advances in plastics during 1943 would not be complete without mention of several excellent contributions in book form to the technical and trade literature. The Plastic Materials Manufacturers' Association issued a compilation of technical data on plastic materials (194). The Society of the Plastics Industry prepared bulletins dealing with assembly gluing (195) and extruded plastics (196). The American Society for Testing Materials brought together in one booklet all of the specifications and testing methods developed by the Society for users and manufacturers of plastics (197). Two further additions were made to the American literature on the chemistry of high polymers (198, 199). The growing alliance between agriculture and industry, as typified by the use of raw materials from the farm and forest in the manufacture of plastics, was reviewed in a non-technical vein (200). A comprehensive reference work concerned with the physical and chemical properties of plastics and their production, fabrication, and application was published (201). At the close of the year another edition of the well-known plastics catalog appeared with its scope expanded by new articles and charts covering all phases of the plastics industry (202).

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Ordnance Keeps 'Em Rolling

(Continued from page 467)

ran with 100% synthetic, 6.00-16 tires:

"The wear on the synthetic tires is no greater than the wear on tires made of crude rubber. The synthetic tires seem in every way equivalent to the crude rubber tires."

We feel these tests of small-size tires should remove any serious questions about synthetic from the mind of fleet owners who are operating large groups of passenger vehicles or light trucks.

It has been rumored that the synthetic passenger-car size of tire cannot be driven over 35 m.p.h., or that it will not give adequate mileage. Our factual data, derived under test conditions more severe than any civilians should be driving today, prove that this rumor is not true.

To show how Ordnance feels about these 100% synthetic tires in the smaller sizes, we have bought over a million, and so far we have not had a complaint from the using troops, who are our customers.

Tests with Medium Tires

The medium tire group is by far the most important since it consumes approximately 70% of all the rubber in the Army's pneumatic tires. It is probably also the most important to fleet operators since the tire sizes involved—7.00-10-ply through 10.00—are those used on the great highway fleets as well as most of the trucks used in city or shorthaul work.

The first tests were run in May, 1942, using synthetic treads, and the results were something of a shock. The reason is indicated in Figure 6. These tires, tested at Camp Seeley at 35 m.p.h., sustained speed, 20% overload per tire, with 10% gravel, resulted in a severe cracking condition.

The same tires at Normoyle, on cross-country service, developed severe chipping and cracking, at very early mileage. This condition is shown very clearly by Figure 7, comparing one of the first synthetic tires with a natural rubber tire of the same make at 3,000 miles. Note that the synthetic tire is much more chipped and cracked than the one made of natural rubber.

These tires demonstrated one of the principal weaknesses of synthetic rubber—lower resistance of the tread to cutting, chipping, and cracking, both on the highway and cross-country. Synthetic rubber has poor tearing resistance, which means that once a slight cut or crack has started, it progresses rapidly.

This phase of the problem, the resistance to chipping and cracking, has been greatly improved by intensive work by industry chemists. The improvement shown in Figure 8 is very noticeable since these tires at 10,000 to 18,000 miles are neither chipped nor cracked so badly as the previous group at 3,000 or some at 6,000 miles.

Controlled tests are now being run over the Alaska Highway to determine the results on all gravel operation. The picture shown in Figure 9 reveals a section of this highway. A number of tires running there have just been examined, and apparently even under these severe conditions the synthetic tires will perform successfully. This will be of interest to operators who operate a lot on gravel roads, particularly in the northcentral and northwest states.

Just to show that others using synthetic rubber have experienced similar trouble, Figure 10, a captured German tire, displays the similar conditions of chipping and cutting to a very advanced degree.

(To be concluded)

Pá-Agronômico Method for Coagulating Rubber

Felisberto C. de Camargo[1] **and Norman Bekkedahl**[2]

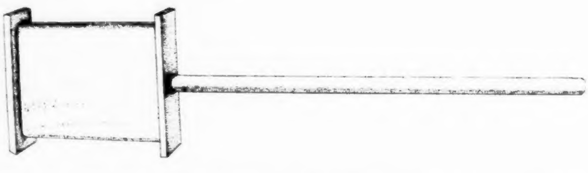

Fig. 1. The *Pá-Agronômico*, on Which the Rubber Is Coagulated by the Smoking Process

THE methods of preparing rubber from the latex of *Hevea brasiliensis* vary considerably, depending mostly on the amount of latex to be handled, the availability of labor both as to quality and quantity, and the transportation facilities. In most rubber plantations the acid-coagulation method is used, and the resulting product is shipped to the buyer in the form of smoked sheet. Another form for shipment from the plantation which has been becoming more and more popular in recent years is that of concentrated latex. However for the *seringueiro* who has but a small number of rubber trees at his disposal in more or less isolated locations, such as is usually the case in the jungles of the Amazon Valley in South America, neither of these methods is either popular or practical. This *seringueiro* is without technical assistance or knowledge and is not familiar with the handling or mixing of acids and other chemicals. He usually does not have capital with which to purchase the apparatus necessary for plantation processes. The lack of adequate transportation makes it impractical for him to ship the latex as such. As a result of long experience, he has found it more practical to coagulate his rubber in the form of a ball by smoking it on a stick.

This ball-smoking process, although having advantages over other methods, also has its disadvantages. It encourages the *seringueiro* to mix dirt, stones, and other foreign material into the rubber for the purpose of increasing the weight. What actually happens, however, is that he receives considerably less in payment for his ball rubber than the plantation owner does for his smoked sheet which is more difficult to adulterate. The smoking process does not drive off all the moisture, and as a result the ball rubber may contain up to 20% of water, or sometimes even more. To remove all these impurities the expensive, time-consuming, and rubber-deteriorating processes of washing and drying are necessary. But despite all this the ball process, which produces "whole latex rubber", seems to give a final product more desirable to many of the rubber industries than does the acid-coagulation process.

To retain the advantages of the "whole latex rubber", and still produce a cleaner rubber, which is more desirable to the purchaser, a modification of the ball-smoking method is being advocated for the *seringueiros* of the Amazon Valley by the Instituto Agronômico do Norte, Belém, Pará, Brazil. The process has been named after that institution as the *Pá-Agronômico* method, which in Portuguese means *Agronômico-Paddle*. This method includes not only the coagulation of the rubber on the paddle, but also the subsequent preparation of the product into its final form for shipment to the buyer.

The *Pá-Agronômico*, a diagram of which is shown in Figure 1, consists of a rectangular-shaped block of wood, approximately 25 by 21 by 3 centimeters, fitted with guards at its ends and fastened to one end of a stick about 75 centimeters in length. This block is usually made from a wood called *macacaúba*, which is quite plentiful in the Amazon Valley. It can, however, be made from any other hard wood or material which has the property of not sticking to the rubber. Undiluted latex, after straining, is poured over the block; the guards prevent it from running on to the ends. The rubber is then coagulated from the latex by smoking, just as is done in the preparation of the ball. However, instead of continuing until a large ball is formed, the process is discontinued after the building up of a fairly uniform layer of rubber about one to two centimeters thick. This rubber layer is cut through along one edge of the block and peeled off, leaving a clean, wet, spongy, smoked slab, which is next pressed with a hand-roll and then passed several times between plain wringer-rolls in order to squeeze out as much water as possible and also to thin out the sheet. Although washing of the rubber is not necessary during this process, it is recommended provided a sufficient supply of water is available. After this the sheet is run between corrugated rolls, just as is done in the process for making ribbed smoked sheet at the plantation. Further drying, of course, is required. This can be accomplished by hanging the sheets in the shade or in a room heated to about 40° C., or preferably in a smokehouse at about the same temperature.

The *Pá-Agronômico* method, if moderate care is taken, produces a sheet which, in addition to requiring no subsequent washing or drying, also has exceptionally good tensile properties. Samples of sheet rubber made simultaneously from the same latex by both the *Pá-Agronômico* and the

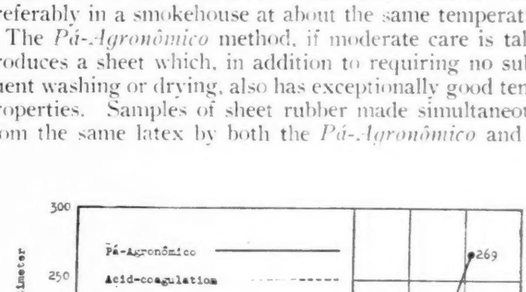

Fig. 2. Comparison in Tensile Properties between the Rubber Coagulated by the *Pá-Agronômico* Method and That Coagulated by the Acid Process

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[2] Chief of the Rubber Laboratory, Instituto Agronômico do Norte; on loan from the National Bureau of Standards, Washington, D. C.

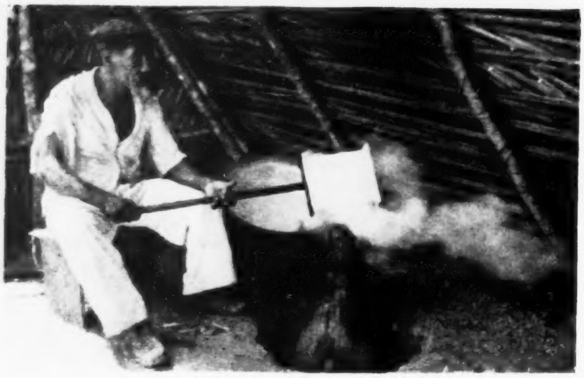

Fig. 3. Coagulation of the Rubber by Smoking on the *Pá-Agronômico*

acid-coagulation methods under their optimum conditions were tested for their tensile properties. Figure 2 shows a comparison between the two types of rubber when vulcanized under optimum conditions (30 minutes at 141° C.) according to the formula:

	Parts
Rubber	100
Zinc oxide	6
Stearic acid	4
Mercaptobenzothiazole	0.5
Sulphur	3.5
Total	114.0

The graph represents an average of a number of tests resulting from the same lot of latex. Although the difference in strength between the two types of sheets as shown by these tests is quite small, similar tests on samples made from other lots of latex also show the higher tensile properties to be in favor of the rubber made by the *Pá-Agronômico* method.

It is important, however, for the *seringueiro* to remember that after he has prepared these sheets of high-quality rubber, he must deliver them to the buyer in the same good condition if he expects to receive top prices for them. It would have been wasted effort on his part if later he allowed his rubber to become wet or dirty, making necessary the additional washing and drying processes.

The *Pá-Agronômico* method, as well as the acid-coagulation method, has the following advantages over the ball-smoking method:

(1) *Pá-Agronômico* sheets do not require subsequent washing and drying. These extra processes, necessary for the ball rubber, not only waste much time and increase the cost of preparation of the rubber, but also decrease the quality of the rubber.

(2) *Pá-Agronômico* sheets can be examined very easily and quickly by the inspector or buyer. The balls must be cut open in order to determine the quality of rubber, and even then it is difficult to make a good examination.

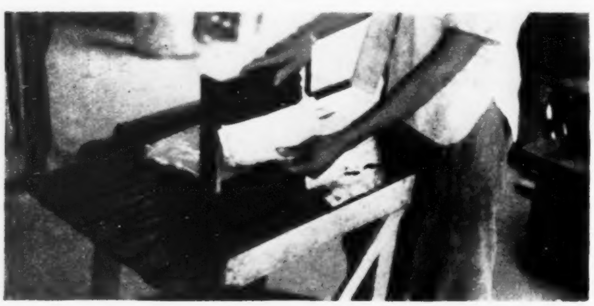

Fig. 4. Peeling the Coagulated Rubber from the *Pá-Agronômico*

(3) *Pá-Agronômico* sheets cannot be so easily disguised or adulterated as ball rubber.

(4) *Pá-Agronômico* sheets contain very little water; while the ball rubber usually contains quite a high percentage.

(5) *Pá-Agronômico* sheets, when stored, take up less space than ball rubber.

(6) *Pá-Agronômico* sheets, having the previously mentioned advantages over ball rubber, demand a higher price.

The *Pá-Agronômico* method also has the following advantages over the acid-coagulation method:

(1) The *Pá-Agronômico* method requires no acid or other chemicals for the coagulation of the rubber. This point not only saves the *seringueiro* the cost of the chemicals and their shipment, but also relieves him of the trouble of handling and mixing the acids, processes which should not be undertaken by inexperienced persons.

(2) The *Pá-Agronômico* method requires less equipment. Although both methods use the plain and the corrugated rolls, the cost of the paddles used in the *Pá-Agronômico* method is small as compared with the cost of the coagulating pans or tanks needed in the acid-coagulation method.

(3) The *Pá-Agronômico* method requires no water. Coagulation sheds can thus be established away from streams or other water supply. The acid-coagulation method requires large quantities of water to be used for diluting purposes and also for washing the acid from the sheets.

Fig. 5. Squeezing out Most of the Water in the Sheet by Means of a Hand Roll

Fig. 6. Squeezing out Water and Thinning the Sheet by Passing It between Plain Rolls

(4) The *Pá-Agronômico* method produces sheets which have less tendency to mold than those made by acid-coagulation. This is probably because of the more thorough smoking in the former method, in which not only the outer or surface part of the sheet is smoked, but also the interior.

(5) The *Pá-Agronômico* method produces a rubber which has qualities somewhat superior to those of the rubber produced by acid-coagulation.

For large plantations, where the volume of production is great, and also where good technical assistance and chemical analyses are available, the acid-coagulation process would undoubtedly still have an advantage over the *Pá-Agronômico* method since the latter is much slower. But for the thousands of *seringueiros* who have a relatively small number of trees at their disposal, as is generally the case along the Amazon Valley, the *Pá-Agronômico* method would be the better. The *seringueiro* would need no special scientific or technical knowledge. His expenditure for equipment would be very small. He would produce the best grade of rubber possible, which should give him a top price for his product.

Recovery of Rubber from Young Guayule Shrub[1]

IN THE Act of March 5, 1942, the Secretary of Agriculture was empowered to conduct large-scale plantings of guayule. He designated the Forest Service as the Departmental agency responsible for administering the act. The Forest Service was authorized, if necessary, to call upon other agencies within the Department of Agriculture to assist in the Emergency Rubber Project. Pursuant to this, the Bureau of Agricultural and Industrial Chemistry was requested to conduct pilot-plant-scale research to develop a method for obtaining the best possible quality of rubber from young guayule.

Guayule rubber has been on the market for more than 30 years. It is produced in Mexico from wild mature shrub of high rubber content, by a process of pebble milling, which, although considerably improved during recent years, still produces a product of mediocre quality compared to *Hevea* rubber. Its principal drawback is the fact that it contains 10% of impurities insoluble in benzene and tends to be soft and tacky. These benzol insolubles consist principally of small fibers and cork from the shrub.

One of the objectives in the guayule program was to produce rubber as quickly as possible. To do this would entail harvesting the shrub in a younger state and with a lower rubber and higher resin content than ever done commercially before. The problem therefore became one of developing a process which would yield rubber from this young shrub and which could be put into successful plant operation by the late Fall of 1944, at which time there would be available for harvest shrub seeded in the Spring of 1942.

A second objective of equal importance, but less urgency, was the ultimate development of a radically different method of obtaining rubber from guayule which would yield a product of the highest possible quality. It was apparent that pilot-plant-scale research would have to be undertaken immediately to attain the first objective, i.e., factory operation on young shrub by late 1944. A survey was made to determine the location at which such investigations could be appropriately conducted. This indicated that to acquire on short notice the elaborate research facilities and extensive staff necessary and to establish them at the principal site of guayule operations at Salinas, Calif., would entail too much delay. It was therefore decided to begin the work immediately at the Eastern Regional Research Laboratory in Philadelphia and later to construct at Salinas an integrated pilot plant with research and control laboratories for conducting the work there after sufficient information had been obtained in Philadelphia to indicate the general nature of the process to be used.

Description of Conventional Process

A logical starting point for research on the processing of young shrub was obviously the method already established commercially for mature shrub. This process is essentially as follows. The shrub is gathered and after sunning is baled and hauled to the factory where it customarily remains in storage for approximately a month's time, during which period the moisture content drops to about 12%. A supplementary drying operation is sometimes employed to obtain the desired moisture. It is then crushed on a series of corrugated rolls running at differential speeds. The crushed product is fed with approximately five times its weight of water into a battery of four continuous pebble mills, each approximately five feet in diameter and 22 feet long. The time of passage through this milling system is approximately 1¾ hours; at the end of this time the plant cells have become ruptured, and the minute particles of the rubber in the rubber-bearing cells have been rubbed together into "worms" about the size of a grain of rice. The slurry is discharged into a flotation tank where the waterlogged bagasse sinks and the rubber "worms" and cork float. By treating the rubber and cork under hydrostatic pressure at about 200° F. the cork becomes deaerated and settles out in a second flotation

[1] This article was prepared with the cooperation and help of members of the staff of the Eastern Regional Research Laboratory of the Bureau of Agricultural and Industrial Chemistry, United States Department of Agriculture, at Wyndmoor, Pa.

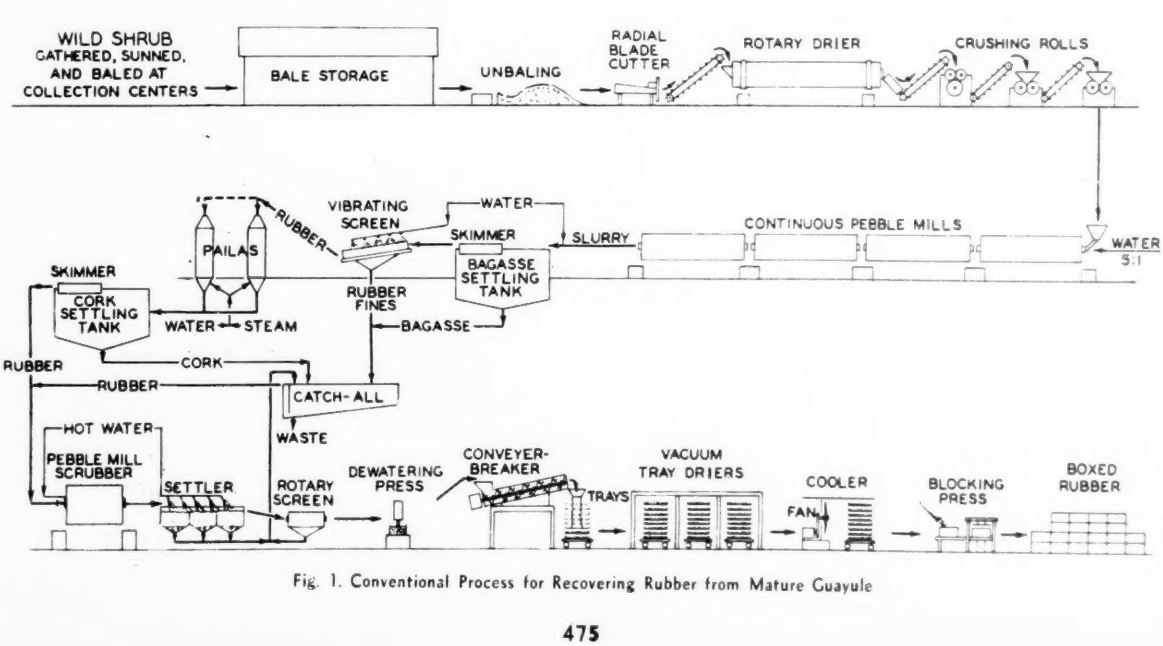

Fig. 1. Conventional Process for Recovering Rubber from Mature Guayule

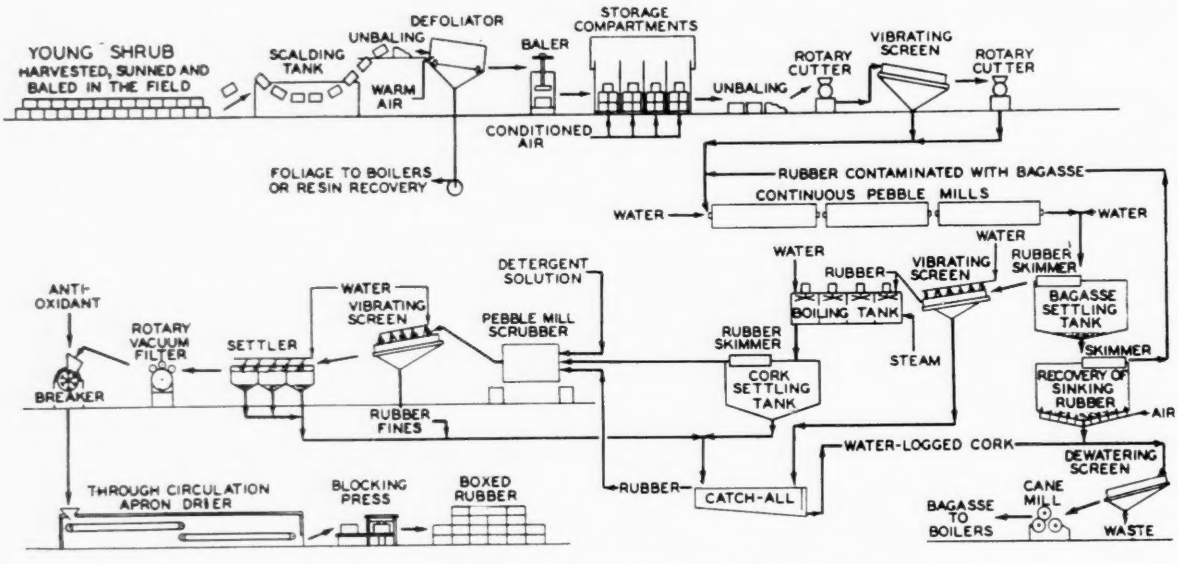

Fig. 2. Proposed Process for Recovering Rubber from Young Guayule

tank. The rubber is here skimmed off, and after a short pebble mill scrubbing to remove traces of adhering plant tissue, it is dewatered by pressing and then dried in vacuum tray driers, blocked, and boxed for shipment. This process is illustrated diagrammatically in the flow sheet of Figure 1.

It was soon apparent that this process was not directly applicable to young shrub, and as the work progressed, methods of simplification and improvement in quality were developed.

The first young shrub to be processed had been planted in the field in April, 1941, and harvested October, 1942, i.e., "18 months' " shrub. Its rubber hydrocarbon content was 3.08%. On pebble milling in the usual way a very low yield resulted. It was observed that this young shrub had a profuse growth of leaves which constituted approximately 30% of the total dry weight of the plant. Since it was known that there is little or no rubber in the leaves, their removal by mechanical defoliation was tried. The resulting defoliated plant gave a satisfactory yield of rubber on milling. This defoliation has been shown not only to improve the over-all yield on milling, but also to give a rubber lower in copper and manganese, and hence more resistant to oxidation, than that obtained from whole shrub. The benzol insolubles in the finished rubber are also reduced. The removal by defoliation of 30% of undesirable plant constituents has the obvious advantage of increasing milling capacity proportionately. Defoliation can be accomplished in a number of ways, as for example, by chemical treatment in the field or by scalding the harvested shrub. Scalding followed by tumbling in a perforated drum seems now to be the most satisfactory method.

Proposed New Process

The modifications in the more or less standard procedure are described below in sequence. They are illustrated in the flow sheet of Figure 2.

Storage. The rubber content of young shrub grown in certain areas such as the Salinas Valley changes very rapidly with the season. If a factory is to operate throughout the year and the shrub is to be harvested at its maximum rubber content, storage of the harvested shrub becomes necessary. Experience with the storage of mature shrub in very dry climates had shown that storage much beyond a month resulted in a decrease in yield and quality of the rubber. Storage tests were therefore instituted on young shrub to determine under what conditions it could be stored without deterioration. It was found that if the shrub were first defoliated and then baled, it could be stored for five months or more without significant loss in yield or quality, provided the moisture content during storage is kept between 18 and 25%. In dry climates this may entail sealed storage with humidification. Under certain climatic conditions storage may be unnecessary as rubber development in the shrub can be controlled by judicious irrigation, bringing it to the proper rubber content when harvest becomes necessary.

Defoliation. Defoliation can be accomplished by immersing the baled shrub as received from the field for approximately ten minutes in boiling water. The bales are then removed and opened, and the foliage removed by tumbling the plants in a perforated rotary drum. Any superficial moisture remaining on the shrub from the boiling operation is removed by introducing warm air in the trommel.

Drying Prior to Pebble Milling. Customary practice with mature shrub has entailed reaching a moisture content of about 12% either by storage or artificial drying in preparation for pebble milling. With young shrub it is apparently unnecessary to dry down to this moisture if storage conditions have been such as to insure coagulation of the latex. If any further drying beyond that which occurs during storage is required, it can be accomplished by introducing warm air into the storage compartment sufficiently in advance of removing the baled shrub for processing.

Preparation of Shrub for Milling. Because of the massive, expensive nature of the crushing rolls customarily employed in preparing shrub for pebble milling, it was considered desirable to substitute, if possible, cheaper equipment. Rotary knife cutters, equipped with screens having ⅛-inch round holes, were found satisfactory for this purpose. The shrub processed in this manner is then admirably suited for pebble milling if the moisture content on cutting is kept between 10-20%.

Shortened Milling with Aeration of Bagasse. It is customary practice to mill shrub for approximately 1¾ hours by passing it in the form of a slurry consisting of about five parts of water to one part of crushed shrub

through a series of four pebble mills approximately five feet in diameter and 22 feet long. In the first stages of milling the crushed shrub is macerated, and the rubber-bearing cells are ruptured. As milling proceeds, the minute particles of rubber released from these cells are rolled together into "worms." At first these "worms" are so badly contaminated with bagasse that their specific gravity is greater than water, but by the time the pebble milling is complete they have been "scrubbed" sufficiently free from contaminants to be capable of floating in water. It has been customary to continue the pebble milling until this condition results. Continuing to mill the entire slurry until all the "worms" are sufficiently clean to float may be unnecessary. Experiments have indicated that it may be possible to continue milling only until all the rubber has been formed into "worms." When the resulting slurry is diluted in the customary manner, a major portion of the rubber will be clean enough to float, and the balance may be recovered from the bagasse after the first settling by a second settling in which the bagasse is aerated. This aeration is designed selectively to float sinking "worms" which are, of course, lighter than the bagasse itself. The sinking "worms" thus recovered can be reintroduced in the feed to the pebble mill battery and will emerge sufficiently scrubbed to float.

Cork Removal. Although young shrub contains much less cork than mature shrub, cork removal is nevertheless a necessary step in rubber production. Cork is customarily separated from the rubber "worms" by heating them in water under high hydrostatic pressure at about 200° F., thus deaerating the cork and permitting it to sink away from the rubber in a subsequent flotation step. Such a batch operation interposed in a continuous process is awkward and entails high labor costs. It has been found possible to remove the cork from guayule "worms" obtained from young shrub by a continuous process consisting of boiling them in water at atmospheric pressure, then settling out the deaerated cork.

Removal of Benzol-Insoluble Contaminants. One of the chief criticisms of recovering rubber from guayule by pebble milling has been that the rubber is agglomerated into "worms" in the presence of plant debris; consequently the finished rubber is invariably contaminated with bagasse and cork. This benzol-insoluble fraction in the rubber is seldom less than 10% and may be as high as 14%, at which point the "worms" become "sinkers" and are lost with the bagasse. The incorporation of these contaminants during pebble milling is unavoidable, but subsequently they can be partly removed. It has been found that one of the simplest means to reduce the benzol insolubles is to add to the small pebble mill used for scrubbing up the "worms" some detergent, for example, ammoniacal ammonium stearate. The "worms" are so thoroughly manipulated in this operation that they are largely freed from debris, which is easily removed by settling and washing. The benzol insolubles can be reduced to 2-3% by this procedure.

Dewatering and Drying. "Worms" from mature shrub were customarily dewatered by pressing. The blocks so formed were broken up, and the rubber was spread by hand on trays for vacuum drying. This process is laborious and costly and damages the rubber. Dewatering by pressing, as usually practiced, left so much water in the rubber that three to five hours' drying was necessary with 30 pounds' steam pressure in the platens. Although the driers were under vacuum, the rubber at the bottom of the trays may have reached temperatures approximating that of the steam used. This resulted in sticking to the trays and deterioration of the rubber. It was found that this entire operation could be replaced by a system consisting of a rotary vacuum filter to dewater the "worms", a simple breaker to tear them apart, and a continuous through-circulation drier. With a high velocity through-circulation atmospheric drier, air temperatures as high as 200° F. may be used, and the product will be superior to that dried under vacuum. It has been further found that the addition of a protective agent to the "worms" before drying results in a much improved product. When a compound of this type, such as Tonox, is used, the rubber is not only protected against softening during drying, but its physical properties are improved, tackiness is eliminated, and keeping qualities are enhanced.

Disposal of Waste. A guayule factory processing young shrub will yield bagasse which, if used for fuel, will adequately supply the power requirements of the factory. The fiber length of this bagasse is so short as to make it of doubtful value as a by-product, and it is therefore proposed to use it as a source of fuel. The bagasse will be dewatered on a vibrating screen and passed through a cane mill which will further dewater it to about 45% moisture, permitting its use as fuel without further drying.

The factory will also have as a by-product approximately 30% of the weight of the shrub in the form of foliage. This is rich in resins. Investigation has shown that these resins are highly unsaturated and consist in part of terpene derivatives probably with conjugated double bonds. Thermoplastic products with widely varying physical properties can be obtained by reacting with sulphur. The products are soluble in aromatic and chlorinated hydrocarbons. Condensation products can be formed by reaction with maleic anhydride and glycol, and glycerine esters can be formed. If any of these products prove to have commercial importance, the resins can be recovered by solvent extraction from the leaves, and the residue will serve as fuel.

Comparison of Guayule Rubber Properties. The data given below provide a comparison of average physical properties and analysis of domestic resiniferous rubber from old shrub with rubber from young shrub prepared by the proposed process.

	Commercial Resiniferous* Old Shrub	Modified Process† Two-Year Shrub
Tensile strength—p.s.i.	2400	3470
Modulus at 600%—p.s.i.	270	1200
Elongation—%	940	800
Cure at 274° F.—min.	35	35
Rubber hydrocarbon‡—%	73	74
Resin‡	16	21
Benzol insoluble‡	11	5

* No Tonox. Somewhat better physical properties may be obtained if Tonox is added to this type of rubber.
† 0.5% Tonox added before drying.
‡ Eastern Regional Research Laboratory methods.

Other Possible Recovery Methods

A long-time research program designed to perfect a new method for isolating rubber from guayule has been carried on for the past year at the Eastern Regional Research Laboratory. A great deal of work was done toward the isolation of the rubber in latex form. Although no commercially feasible method for so isolating the rubber has yet been developed, the work demonstrated the important fact that when the latex in the guayule plant is isolated without contamination with resins or plant debris, the resulting rubber is comparable in quality to *Hevea* rubber. With this challenge, investigations are being continued in an effort to isolate the highest possible quality of rubber from the guayule shrub.

To recover latex from the shrub it must have latex in it: that is, it must be freshly harvested or kept for only a short time in cold storage. To isolate the latex entails the

(*Continued on page 479*)

Recent Russian Literature on Natural and Synthetic Rubber—VII

M. Hoseh

ON THE Vulcanization of Rubberized Webs in Kettles. P. I. Esman, *Kauchuk i Rezina*, 10, 31-36 (1938). **SN-22.**

For the present there is no reliable objective method to determine the degree of vulcanization of rubberized webs. The method now applied relies entirely on the touch and feel of the operator. Two problems are of paramount importance: how to bring about the best vulcanization of rubberized materials, and how to gage the optimum results. In vulcanizing materials wound on a drum, the question arises how long a piece of material should be wound on one drum. Calculating it would prove complicated as one would have to consider the heat conductivity of the material, of the air between successive layers of material, etc. It was found empirically that best results are obtained when the material wound on the drum has an overall thickness of 40-50 mm. (1.6-2 in.). To calculate the length the following formula is used:

$L = \frac{D + d}{2a} \pi S$, where L is length of the wound fabric, d is the diameter of the drum, D is the diameter of the drum together with the material wound on it, a the thickness of the rubberized fabric, and S the thickness of the fabric wound on the drum. $\frac{D + d}{2}$ becomes the average diameter of the drum together with the fabric wound on it; S was fixed as 40-50 mm. Putting $c = \frac{D + d}{2} \pi S$ this value becomes constant for any one drum. Therefore $L = \frac{c}{a}$.

A series of experiments was done to find the optimum vulcanization. Together with the drums of fabric, into the vulcanizing kettles were placed samples of rubber 0.5-1.0 mm. thick used for rubberizing the fabric. These samples were wound on cores to the same thickness as the fabric on the drum. The vulcanization was done for three different periods: part was done at the optimum time found empirically, the other two periods were ± 30 minutes. From the vulcanized material samples were taken both from the rubber and from the rubberized fabric. The samples were taken at the beginning, middle, and end of the winding. The samples were tested for free sulphur and for swelling in benzene. The results are presented graphically. From these results the following conclusions are drawn: (1) rubberized fabric wound on drums and vulcanized in kettles does not give uniform results. In most cases the middle layers are under-vulcanized. (2) Generally the vulcanization procedures established by "feel and touch" give very satisfactory results. Analyzing the vulcanized fabric for free sulphur as a control gives very close approximation to optimum conditions obtained by "feel and touch." In such cases, the rubber used in the coating operations should be processed along with the fabric. Tests of the swelling of the vulcanized product are not conclusive. These tests are helpful only when the determination of sulphur is not conclusive.

Aging and Stabilizing Soviet Gutta Percha. S. G. Zhavoronok, P. G. Piskareva and I. A. Adamov, *Kauchuk i Rezina*, 11, 18-21 (1938). **N-7.**

The physico-chemical indices, such as resistance to tear, relative elongation, etc., are lowered by aging in both vulcanized and unvulcanized gutta percha. Of a number of accelerators tested for their anti-aging effect on gutta percha, the best were found to be thiuram disulphide and K-1. However the relative elongation, after aging, is lowered as compared with gutta percha without these accelerators. The best antioxidants, however, for unvulcanized gutta percha were found to be: Neozone D, aldol-α-naphtylamine, pyrogallol, hydroquinone, Butanite, and Stabilite. It is recommended to add one of these substances in the preparation of gutta percha. Carbon black helps to preserve the strength and relative elongation of aged gutta percha. Of the plasticizers, Rubrax and coal tar were found the best for increasing the resistance to aging of both vulcanized and unvulcanized gutta percha. Antimony sulphate and Vulcan blue are also effective in preserving the mechanical indices of aged unvulcanized gutta percha. The acetone extract of aged unvulcanized gutta percha containing stabilizers changes but little from the acetone extract of the same samples before aging. The acetone extract of gutta percha with no antioxidants increases considerably after aging. The use of Captax as accelerator produces vulcanized products having better physico-chemical indices than when thiuram disulphide is used.[1]

Pine Tar as Ingredient in Compounding Rubber. A. M. Ushakov, *Kauchuk i Rezina*, 11, 21-34 (1938). **M-14.**

Variously treated pine tar and tar of birch were tested as plasticizers of rubber mixtures with 100% SK. Fifteen parts by weight of tar were used per 100 parts of SK. For comparison was used a control in which the tar was replaced by three parts of stearic acid and five parts of Rubrex. The chemical and physical analyses of the tars and the results of chemical, physical, and mechanical tests made on the products are tabulated in detail.

These tars gave definitely more plastic (by Karrer) products than the control: 0.33-0.4 as compared with 0.28-0.29 for the control. Crude tar gave harder (by Shore) mixtures (58-64) than the control (47); whereas cooked tar gave softer mixtures (40-46). The resistance to aging (by Geer) was: control 0.75, crude tar 0.4-0.5, cooked tar 0.66-0.7. The mechanical strength was improved by tar. This was seen best in the elasticity product: control 67 thousands, crude tar 72-84 thousands, and cooked tar 85-105 thousands.

As seen from photomicrographs, the dispersion of carbon black and other ingredients is more effective with Galipot cooked tars. As to the tars themselves: of the crude tars, retort pine tar is preferable to oven pine tar and birch tars. It imparts a greater elasticity, better

[1] The editor of *Kauchuk i Rezina* does not consider this conclusion justified because of the doubtful experiments on the basis of which this conclusion is drawn.

mechanical properties, and greater resistance to aging. But the optimum vulcanization time is somewhat longer with retort tar than with oven and birch tars. Compared to the crude pine tars, boiled tars have a considerably smaller acid number, contain considerably less volatile matter and moisture, and contain no water soluble acids. They impart better mechanical properties than the crude tar and especially better than the oven tar. The plasticity is almost the same with tar of either of these groups. However the plasticity imparted by Galipot cooked tars is somewhat higher than with oven tar, 0.35-0.37 as compared to 0.32-0.33. The optimum vulcanization time is generally shorter with cooked tars than with crude tars while the resistance to aging is somewhat higher for cooked tars than for oven tars. The mixtures containing cooked tars are smoother than those made with crude tars. Galipot Nos. 1 and 2 give a better dispersion and greater homogeneity of the mix. Quite significant is the effect of the amount of substances distilled off on the properties of cooked tar. When the amount distilled off was raised from 14 to 40% the amount of volatile matter, water soluble components, and acid number decreased. Simultaneously the plasticity of the mix, the resistance to aging, and hardness decrease, but the elasticity product increases considerably. For use in tires the best tar is one having the following properties: moisture not over 0.5%; ash not over 0.3%; volatile matter at 150° C., not counting H_2O, not over 5.0%; water soluble acid not over 2 mg. of KOH; acetic acid not over 0.2%; acid number in mg. of KOH per 1 g., 30-40; mechanical impurities 0.1-0.25%; viscosity, as need may be. The effect of the component parts of tars, such as resinic acids, phenol, etc., on the properties of tars as rubber plasticizers were investigated. But the results obtained up to now are not yet conclusive.

Regenerating Rubber by the Solution Method of Glazunov and Ptitsyn. B. Ya. Osipovskii, F. A. Vergiles, and B. V. Mamontov, *Kauchuk i Rezina*, 11, 54-63 (1938). **SN-23.**

The method prosposed by Glazunov and Ptitsyn in 1927 consist of the following procedure. Coarsely ground rubber (natural) is placed into a series of tanks. A stream of the solvent (xylol) is started into the first tank, whence it flows consecutively through the others, and the liquid leaving the last tank is collected. It consists of the solvent and the dissolved rubber. The solvent is distilled off by steam, and the rubber remains behind. When the rubber in the first tank is dissolved, it is recharged with more ground scrap rubber and switched to the end. Thus the first tank now becomes the last, and the second becomes the first. The process continues in the same manner. The temperature of the solvent is kept below its boiling point. No pressure is required.

Employing this method for regenerating SK was suggested, and the authors tested this method on SK. One part of the experiments was done in an autoclave and the other in a specially constructed set-up closely resembling the conditions in the first tank used by Glazunov and Ptitsyn. The process was tried on a SK tire ground to various sizes. As solvents were used white spirits, an olefinic heavy fraction, and a mixture of the two. The characteristics of the heavy fraction are: d_{20} 0.831, insoluble matter 97%, bromine number 166.9, fractionation (Engler) first drop 130° C., 130-140° C. 5%, 140-150° C. 80%, 150-160° C. 15%. The method employed in these experiments are described in detail. The process was tested on samples of tires made entirely of SK, then on each of its component parts, i.e., carcass, protective layer, and outside layer. The temperatures tested were 150°, 170°, 180°, and 190° C. The results achieved under various conditions ranged from the lowest, 10.53%, to the highest, 78.20%, of SK recovered. The highest results were obtained at 190° C. using white spirits as solvent. At the higher temperatures the fabric became scorched. It is concluded from these results that the Glazunov-Ptitsyn method is not suitable for reclaiming SK. At no time could all of the SK be reclaimed. At the higher temperatures giving the best values of reclaimed SK, the fabric was scorched. Tests on the reclaimed product showed it to be definitely inferior to the original.

Regeneration of SK. *Kauchuk i Rezina*, 11, 63-73 (1938). **SN-24.**

This article is a compilation of a discussion held on the question of regenerating SK on June 21, 1938.

(To be continued)

Recovery of Rubber

(Continued from page 477)

rupture of the latex-bearing cells which can only be done by the application of severe mechanical forces. Such forces tend to coagulate the latex. The latex dispersions, isolated from shrub processed for example in the presence of an anticoagulant, contain in general less than 1% rubber, and their concentration is consequently difficult. These are only some of the problems entailed in isolating latex from guayule. The obstacles are not necessarily insuperable; nor is isolation of latex necessarily a prerequisite to obtaining a high-grade rubber from young guayule.

Conclusions

In the light of the work which has been done in the past year on the recovery of rubber from young guayule, it can be anticipated that the factories to be in operation by the Fall of 1944 will produce a product superior to the well-known guayule rubber of commerce. It will be less tacky, tougher, lower in benzol-insoluble impurities, and of good keeping quality. Its resin content will probably be nearer 20% than 16% because of the higher resin content in the young shrub. However, if conditions obtaining at that time require it, the product can be deresinated.

Lead and Zinc Pigments in 1943

Lead and zinc pigments and zinc salts showed varied sales trends in 1943, according to preliminary figures from the Bureau of Mines, United States Department of Interior. Litharge and red lead, recovered in 1943 from the reactions in 1942 that followed the record high tonnages sold in 1941, and both pigments had their second-best years. They were 23 and 8%, respectively, higher than in 1942 and 8% and 3%, respectively, below the records set in 1941. Zinc oxide made the largest percentage gain of any of the products covered by the report, rising 43% over 1942 figures. Zinc chloride sales gained 6% in 1943, as indicated by preliminary data. The companies covered by this canvass reported significant sales also of zinc sulphide, zinc borate, and zinc chromate.

EDITORIALS

Science, Manufacturing, and Government

IN AN address before the American Section of the Society of Chemical Industry in New York on January 7, Gaston Du Bois, senior vice president of the Monsanto Chemical Co., discussed a situation which should receive serious consideration by certain parts of the rubber industry. Du Bois, who received the Perkin Medal in recognition of his outstanding accomplishments in the field of applied chemistry, advocated more active participation by men and organizations of science in the affairs of the nation, state, and community and recommended the establishment of a competent committee of representatives of the scientific and manufacturing fields for the purpose of studying government research and manufacturing activities in order to enable these representatives to make constructive suggestions on policy and scope as well as on budgets.

Du Bois pointed out, and rightfully so, that it is useless and unbecoming to criticize the activities of the city, state, and federal governments unless constructive ideas and a sound alternative program can be suggested. On the important problem of the extent to which the federal government should in peacetime continue in the manufacture of such things as ammonia, styrene, butadiene, synthetic rubber, etc., the speaker said he did not know that answer, but he said that he did know that the facts should be obtained without prejudice or partisanship. Why should we (the chemical industry) wait for the lawmakers to give us the answer, he added.

We have in this country strong and well-organized scientific, engineering, and manufacturing societies and associations, all of which at times have expressed concern and dissatisfaction with the policies of government in industry and science. By taking an even more active interest to the extent of actual participation with the legislative and executive branches of government in formulating policies and laws having to do with such things as disposal of government owned plants and products, the patent system, and the extent of government regulation of national and international business, a sound national program which would better serve the needs of the whole nation, could be created.

Efforts of the various societies and associations of science and industry to analyze and plan for the future have been to a great extent independent of much contact with governmental agencies and legislators, whose responsibility it is to shape future policy. Since it is usually, if not always, true that the collective wisdom of the majority is greater than the wisdom of a chosen few, it would seem to make a case for as many as possible of those involved in the future course of science and industry to take a more aggressive part in shaping that course. This does not mean just "lobbying," but real attention to the details of the problems at hand, taking into account the viewpoints of industry, science, and government in arriving at the best solution for all concerned.

How to Keep the "No Strike" Pledge

IT IS indeed gratifying to note that among the organized labor groups in the various industries, the United Rubber Workers, CIO, seems to be a leader in actually trying to do something about keeping the pledge of "no strikes" for the duration. Work stoppages or wildcat strikes over minor grievances have been occurring in the various rubber plants for months, and the action during January of Sherman H. Dalrymple, president of the URW, in expelling 72 tire builders who took part in a work stoppage at The General Tire & Rubber Co. and two millroom workers at the Goodyear Tire & Rubber Co. who were the leaders of a strike at that company is a step in the right direction. This action should be of real value in establishing a more logical balance between the power of unions in industry and the amount of responsibility they accept by virtue of this power. It will be recalled that in the summer of last year the United Rubber Workers Union promised that considerably more than the required 30,000,000 civilian tires required in 1944 could be turned out in existing plants if additional machinery were installed and thus won its fight to prevent decentralization of the tire industry as advocated by management in order to prevent just such wildcat strikes as have occurred. That the union officials have realized and accepted their new increased responsibility that the "no strike" pledge be conscientiously kept because of its vital importance to the war effort is evidenced by the statements made by Mr. Dalrymple at a meeting of union and management officials at The General Tire & Rubber Co., held to formulate cooperative action against wildcat strikes.

"Any grievance that can be settled after a plant has been closed down can be settled before the plant is closed down.

"I am firmly convinced that management cannot destroy union organizations even if management so wished, but the government can destroy them by tying my hands and yours with legislation.

"All of us should understand that labor, capital, and management are vital to one another. Labor and management cannot get along without capital; capital and management cannot get along without labor, and labor and capital must have management; so we must all work together."

In view of the present day status of the relations between capital, management, labor, and government, continued adherence to and understanding of the above policy by the rank and file as well as the officials of the United Rubber Workers Union will do much to improve the reputation and stature of this organization. There are many officials and members of other union organizations that could profit by adopting a policy along the above lines. An opportunity would seem to have been presented for the establishment of an improved capital, management, and labor relation.

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What the Rubber Chemists Are Doing

PR-154 Compounding Agent for Synthetic Latices

Paul M. Fleuriel[1]

WE HAVE now reached the point where the long-heralded synthetic rubbers are now actually in the hands of the many industrial chemists whose function it is to make the conversion to the new product final. True, the supply is still somewhat limited, and restrictions as to end-use are very much in the fore, but looking back only one year we should feel that great progress has been made. This fact should be appreciated with realism, for there will still be dislocations, shortages, changes in regulations, etc., and a great number of problems remain which are beyond the work of the organic chemist who has given us these new tools for our industry. A good many research hours will be required to iron out the many practical difficulties which are encountered at every turn wherever synthetic elastomers are replacing natural rubber. We are short of experienced men, and our conception of the proper approach, as well as the available equipment with which we are working, is at times faulty.

We shall consider only the progress made in one direction, which deals with the compounding of neoprene latex in such a way that the resulting film may be both modified and extended. All artificial latices differ from natural latex in that they are dispersions based on soap systems; while the natural rubber latex is a protein system. This important lack of similarity automatically eliminates a number of theories and practical conceptions of compounding. To increase the difficulties, radical differences in stability, adhesiveness, and cohesiveness of the synthetic latices and their films are found. Therefore past experience was of little value, for entirely new ingredients and new techinques had to be developed.

It was with the above conditions confronting the industry using natural latex that work was started to overcome the objections of the ultimate users of the synthetic latices. The results of these efforts have produced PR-154, compound, a water dispersed compound of polymerized resins and colloids, which should be of considerable interest to all users of neoprene latex, particularly those who have technical facilities to adjust the formulae to suit their specific requirements.

There were three objectives which we have attempted to attain in this work, i.e., extension, modification of the film, and machine workablity of the compounded synthetic latex. In spite of the present war economy in which producing goods is more important than their cost, the latter cannot be ignored and will be increasingly significant as a closer evaluation of any given production problem is attemped. At first latices at any price will do; then comes a period of reflection and the present greater availability of synthetic latices forces consideration of the initial material used.

PR-154 can be used in this case as an extender in order to reduce price without unduly reducing the physical characteristics of the final film. This compounding material is compatible with neoprene latex in all proportions, although the total solids will vary depending on the viscosity desired. The amount of extension possible depends on how far from the original film it is feasible to go. There are a great many adhesive problems which can be solved with a 100% extension. When it is remembered that neoprene latex films have practically twice the tensile strength of natural latex films (uncured), it is conceivable that much greater amounts can be used and sufficient strength still retained for specific applications.

As we consider more deeply the difference in the dispersing mediums of neoprene and natural latex, we find that the commonly used gums and proteins, as well as resin dispersions, could not be used to increase the pressure sensitivity of a dry rubber film or to modify its cohesiveness and adhesiveness to the same extent. To obtain the required results with neoprene and Buna S latices it was necessary to reconsider past practice. In PR-154 the compounder will find a material by which the film can be either changed slightly or the modification can be carried to the point where dry tack will be retained for a period of several days. This range of results is very important, particularly where the requirements vary as to the time which may elapse between cementing and ultimate bonding of the dried films. Very small additions of PR-154 may be used so to modify films for industrial dipped goods that the cohesiveness of the films will be changed in a way that will be helpful in handling these films.

In compounding any elastomer the question of aging is of great importance, and PR-154 has been so formulated that it will be adequate for most normal requirements. However the consumer should determine specific aging needs in order that the compound used contains the necessary ingredients to satisfy all conditions. No one compound can meet all needs, but the application in which PR-154 has been used have proved to be adequate in a great many cases.

The final test of any compound is its workability in various types of equipment where it will ultimately be used. In producing PR-154 this has been kept in mind with the result that in many instances the characteristics of the latex in which it is used have been improved to such a degree that it has again become practical to use the latex in machines where formerly it had been impossible. Again, it must be clearly stated that further compounding may be necessary, but the addition of PR-154 may be sufficient in many instances.

In conclusion it must be kept in mind that in research no problem is ever finished, nor is perfection ever achieved. It was felt that the users of synthetic latices were in need of immediate information as the availability of these materials was recently increased. More data will be made known when it is confirmed by further work, but, meanwhile, PR-154 should prove to be a useful material.

[1] Chief chemist, Union Bay State Co., 50 Harvard St., Cambridge, Mass.

A.S.T.M. Symposia on Synthetic Rubbers and Plastics Planned

TWO extensive technical symposia, one covering the applications of synthetic rubbers, the other on plastics, will feature forthcoming meetings of the American Society for Testing Materials. The discussion on rubber will be held during the A.S.T.M. spring meeting in Cincinnati, O., on March 2 at the Hotel Netherland Plaza, with morning and afternoon sessions. The symposium on Plastics will be held in Philadelphia, Pa., with two evening sessions, one on February 22 at the Franklin Institute and the other on February 23 at the Benjamin Franklin Hotel.

Synthetic Rubber Symposium

Except insofar as necessary for background information, the authors of the papers to be given on synthetic rubber do not plan to deal with the chemistry or manufacture of the crude synthetic rubber, but instead will give latest information on properties of these materials, and other features that would be of interest especially to those who are using the synthetic rubber products. Under the chairmanship of Arthur W. Carpenter, manager of testing laboratories, B. F. Goodrich Co., and secretary of the Society's Committee D-11 on Rubber Products, a Symposium Committee consisting of: S. Collier, Johns-Manville Corp.; H. I. Ebert, Firestone Tire & Rubber Co.; H. M. Frecker, Jr., United States Rubber Co.; W. H. Gardner, of A.S.T.M. Committee on Publications; Oliver M. Hayden, E. I. du Pont de Neumours & Co., Inc.; J. H. Ingmanson, Whitney Blake Co.; E. G. Kimmich, Goodyear Tire & Rubber Co.; Irving E. Lightbown, Stanco Distributors, Inc.; S. M. Martin, Jr., Thiokol Corp.; W. J. McCortney, Chrysler Corp.; W. D. Parrish, Hycar Chemical Co.; Gerald Reinsmith, Offce of Chief of Ordnance, USA; G. H. Swart, General Tire & Rubber Co.; and T. A. Werkenthin, Bureau of Ships, U. S. Navy, has been formed. This committee has developed two technical sessions in which prominent authorities in their respective fields will participate. The program follows:

"The Origin and Development of Synthetic Rubbers", Harry L. Fisher, U. S. Industrial Chemicals, Inc.

"Physical Tests of Synthetic Rubber Products", Leslie V. Cooper, Firestone

"Physical Properties of Synthetic Rubbers", John M. Ball, R. T. Vanderbilt Co.
"Specifications for Synthetic Rubber Compounds", M. J. DeFrance, Goodyear.
"Processing Characteristics of Synthetic Rubbers and Their Use in Extruded Products", A. E. Juve, Goodrich.
"Synthetic Rubber Tires and Inner Tubes."
"Hose and Belting Made from Synthetic Rubber", W. I. White, Manhattan Rubber Mfg. Division, Raybestos-Manhattan, Inc.
"The Use of Synthetic Rubbers in Molded Products", Merle Sanger, General Tire.
"Synthetic Sponge Rubbers", Louis P. Gould, Inland Division, General Motors Corp.
"Hard Rubber Products", Walter H. Juve, consulting rubber technologist.
"Use of Synthetic Rubbers for Insulated Wire and Cable", R. A. Schatzel, General Cable Corp.
"Footwear and Protective Coatings", Stanton Glover, U. S. Rubber.
"Synthetic Rubber Adhesives", Fred J. Wehmer, Minnesota Mining & Mfg. Co.

The A.S.T.M. committee in developing the synthetic rubber symposium learned that the Technical & Scientific Societies Council of Cincinnati had invited J. L. Collyer, president of Goodrich, to speak at its monthly meeting, and it was possible to arrange this for the evening of March 2, following the A.S.T.M. symposium. He will discuss synthetic rubbers, stressing their development and particularly some of the economic and industrial angles. This meeting will be in the Taft Auditorium. All members of the Cincinnati Societies have been invited to attend the A. S. T. M. meeting, and many A.S.T.M. members will be at the session at which Mr. Collyer speaks.

Symposium on Plastics

The symposium on plastics, with many leading technical people in the industry participating, was arranged by the A.S.T.M. Philadelphia District Committee under the chairmanship of F. G. Tatnall, Baldwin-Southwark Division, Baldwin Locomotive Works, in connection with the meetings (February 21 to 24) of Committee D-9 on Electrical Insulating Materials, and D-20 on Plastics. There had not been a symposium in A.S.T.M. on this subject since the one in Rochester in 1938. Meanwhile, there have been very notable developments in the field, and Committee D-20 on Plastics has issued a large number of tests and specifications. A feature of the symposium will be the presentation by G. M. Kline, National Bureau of Standards, of information and data furnished by seven technologists covering salient features of leading plastic families. The complete program follows:

Technical chairman of first session at Franklin Institute, February 22, Robert Burns, Bell Telephone Laboratories, Inc., Chairman A.S.T.M. Committee D-20 on Plastics.
"Introduction to Symposium", Robert Burns.
"Heat Resistance of Laminated Plastics", E. O. Hausmann, Continental-Diamond Fibre Co.
"Effect of Environmental Conditions on the Mechanical Properties of Plastics", T. S. Carswell and H. K. Nason, Monsanto Chemical Co.
"Diffusion of Water through Plastics", George Deeg, Jr., and Carl J. Frosch, Bell Telephone Laboratories, Inc.
"Testing of Nonrigid Plastics", R. F. Clash, Jr., Bakelite Corp.
Technical chairman of second session, at Benjamin Franklin Hotel, February 23, Myron Park Davis, Otis Elevator Co., Chairman A.S.T.M. Committee D-9 on Electrical Insulating Materials, and New York District Committee.
"Fatigue and Damping of Plastics", B. J. Lazan, Sonntag Scientific Corp.
"Testing in Connection with the Development of Strong Plastics for Aircraft", Henry Sang, Naval Air Experimental Station.
"Summary of Properties, Uses, and Salient Features of Families of Plastics", Dr. Kline.

Participating in this section of the symposium will be following:
"Phenolic Materials—Molded and Laminated", W. A. Evans, Bell Telephone Laboratories.
"Urea and Melamine Plastics", Ladislav Boor, American Cyanamid Co.
"Allyls", Franklin Strain, Columbia Chemical Division, Pittsburgh Plate Glass Co.
"Vinyl Plastics—Rigid and Nonrigid", H. L. Drukker Carbide and Carbon Chemicals Corp.
"Acrylates", Willard F. Bartoe, Rohm & Haas Co.
"Polystyrenes", W. C. Goggin, Dow Chemical Co.
"Cellulose Plastics", W. E. Gloor, Hercules Powder Co.

Active in planning the symposium in addition to Chairman Tatnall were G. H. Mains, National Vulcanized Fibre Co. and R. W. Orr, RCA Victor Division of Radio Corporation of America. The officers of A.S.T.M. Committees D-20 and D-9 cooperated.

All technologists concerned with plastics are cordially invited to attend these sessions.

Synthetic Rubber Discussed at Detroit S. A. E. Meeting

INFORMATION on the properties and uses of synthetic rubbers, as it concerned the automotive and aviation industries, was presented at the war engineering annual meeting of the Society of Automotive Engineers at the Book-Cadillac Hotel, Detroit, Mich., January 10 to 14. A report on the results of U. S. Army Ordnance tests on synthetic rubber tires entitled, "Ordnance Keeps 'Em Rolling" was given by Lt. Col. B. J. Lemon and Capt. J. J. Robson of the Army Ordnance Department. The major portion of this paper will be found on pages 463-67. A survey of the government synthetic rubbers in comparison with natural rubber was provided by A. A. Somerville, of R. T. Vanderbilt Co., in a paper entitled, "The General-Purpose Synthetic Rubbers in the Automotive Industry." Further information on the use of synthetic rubber in the aviation industry was presented in a paper on "Synthetic Rubber Applications on Aircraft Engines" by Gertrude Spremulli, of Ranger Aircraft Engines.

The results of laboratory tests on compounds of Buna S (GR-S), neoprene (GR-M), and Butyl (GR-I) rubbers with special reference to their tensile strength, elongation, modulus at 300% elongation, Shore hardness, load at 20% deflection, compression set at 400 p.s.i., adhesion to steel, heat build-up, resistance to flex cracking, cold resistance, sunlight and ozone resistance, and swelling in hydraulic brake fluid, were reported and described by Dr. Somerville in his paper. Mention was made of the greater variability of the general-purpose synthetic rubbers at the present time and the greater difficulty in processing. The need of a great deal of additional work to adapt these synthetics for uses where load deflection and compression set characteristics are of major importance was stressed by this speaker, and he warned that in using synthetic rubbers the automotive engineer must analyze needs closely and select the rubber which provides the desired qualities. It was pointed out that although natural rubber combines in it more good properties (excluding oil and solvent resistance) than any of the GPS rubbers, the present emergency demands rapid completion of the conversion program. It might also be concluded, this speaker said, that conversion to synthetics should not be made on a cost basis. If the rubber goods manufacturer selected and recommended that synthetic which his tests had shown to be the most suitable, regardless of cost and with intelligent and understanding cooperation between the engineers of the automotive industry and the manufacturers of automotive products, the conversion program should be completed satisfactorily.

The good general physical properties, heat and cold resistance, and moderately good oil resistance of the neoprenes, the outstanding oil resistance of the Buna N rubbers, and the relatively similar physical properties of the Buna S rubbers in comparison with natural rubber, plus the good resistance to abrasion of the former, indicated that these synthetics may be used as substitutes for natural rubber during periods of shortage, and as replacements for natural rubber in some applications for which the synthetics are superior, it was reported by Dr. Spremulli. Selection for aircraft-engine applications was said to be a serious matter of application analysis and of laboratory testing both of the raw stock and the finished parts. Proper design of parts was reported also to be essential, and it was further stated that consideration must be given both to normal operating conditions and to the most unfavorable conditions which might be encountered in use.

Non-Hygroscopic, Self-Emulsifying, Edible Oil Available

PROPYLENE LAUREATE, a light amber, edible, non-hygroscopic oil, which is completely dispersible in water to form milky emulsions whose viscosity can be controlled and is miscible with alcohols, glycerine, glycol, solvents, oils, etc., is now available in commercial quantities. This material has a relatively high boiling point, has a pH in a 5% aqueous dispersion of 8.0, and is non-toxic and practically odorless. In addition to its value in the preparation of emulsions for wood, leather, and metals, it should be of interest in the preparation of lacquer emulsions and for dry cleaning preparations because of its powerful detergent and foam-reducing capabilities. The paper and textile industry should find its tendency for retaining moisture of particular interest in connection with its use as a general emulsifying agent. The Beacon Co., 97 Bickford St., Boston, Mass.

Polymel Resins for Bunas

A NEW series of reenforcing resins, under the generic name Polymel, have been developed for the purpose of aiding in the difficult task of obtaining uniformly high tensiles and elongations with the Buna S (GR-S) and Buna N synthetic rubbers. These resins, which are available in adequate quantities, are not pure chemical compounds, but composite resins resembling solid emulsions. Because of the inherent differences between oil soluble and oil resistant synthetics it was found necessary to develop separate resins for the different types of rubber, and at the same time the idea of developing reenforcing characteristics in the resins was included in the program.

Polymel "B" gives relatively high tensiles (1100 p.s.i.) and elongations (850%) when cured in a pure gum GR-S compound from 30 to 60 minutes at 300° F. and at the same time provides tensiles as high as 2800 p.s.i. and elongations of 800% at the same cures in compounds containing 40 parts of channel black. Polymel "D" gives maximum, all-round characteristics to GR-S compounds by virtue of its high compatibility with GR-S and shows excellent physical properties before and after aging. Polymel "C" is a solid resin readily compatible with the oil resistant rubbers and will mill into these rubbers with a minimum of processing to yield smooth running compounds with high optimum physical properties. In a Hycar OR compound containing 40 parts of channel black and 20 parts of Polymel "C," tensile strengths of from 3,600 to 3,800 p.s.i. and elongations of about 650% are obtained in 45 to 60 minutes at 287° F.

In developing these resins particular attention was paid to imparting desirable processing characteristics to the rubber stocks, such as smoothness, low shrinkage, reasonable tack, ease of incorporation of the resin, and producing firm-bodied stocks which would tube smoothly and hold their shape. When compounding either GR-S or Buna N rubbers, because of the great help provided by Polymel in the dispersion of the fillers, it is recommended that the Polymel be added first. Polymel Corp., Baltimore, Md.

Vinyl Resins Discussed

THE December meeting of the Ontario Rubber Group of the Canadian Chemical Association was held December 16 at the University of Toronto, Toronto, Ont., Canada, with about 50 members attending. K. B. Mathewson, service engineer of Canadian Resins & Chemicals, Ltd., spoke on "Vinyl Resins in the Rubber Industry." He first described the polymerization of these resins in a general way and then gave the physical and chemical properties of vinyl resins. He emphasized the importance of care in the selection of plasticizers. Starting with the earliest commercial vinyl resin used in Canada, polyvinyl acetate, known under the trade name of "Gelva", resins produced by partial or complete hydrolysis of the acetate groups, i.e., polyvinyl acetate-alcohol ("Solvar") and polyvinyl alcohol ("PVA") were then described; next considerable time was devoted to the acetal resins. The first acetal resins dealt with were polyvinyl acetal ("Alvar") and polyvinyl formal ("Formvar"), the former resulting from reaction with acetaldehyde and the latter from reaction with formaldehyde. "Formvar" resin, a very tough material, is used for magnet wire enamel and for wood impregnation, it was stated. The last and probably most important aldehyde derivative, polyvinyl butyral, known commercially as "Vinylite" X series, "Butvar", "Butacite", and "Saflex" M and TS, were next discussed, and processing procedures for cloth coating were explained in some detail for the "Saflex" TS compounds and included mixing, calendering, and curing temperatures and times.

In describing the polyvinyl chloride and polyvinyl chloride-acetate resins, it was stated that by copolymerizing a small amount of vinyl acetate with vinyl chloride, (5-15%), copolymer resins were formed which exhibited the high chemical resistance and toughness of the straight chloride resin, but which were internally plasticized to some extent by the acetate groups, which facilitated compounding, milling, and calendering. Of this group the VNYW grade has had the widest rubber type applications; and typical formulations, and compounding and processing techniques were given. It was pointed out that fillers, with few exceptions, do not reenforce resin compounds as they do rubber, and their primary use is as an extender for the resin and secondarily to cheapen the formulation. As heat stabilizers to inhibit thermal decomposition of the resin during milling, calendering, extruding, or baking, were mentioned sublimed blue lead, powdered metallic lead, chrome orange, white lead, and litharge. A new development with these types of resins is the dispersion method, by which the resin, plasticizer, pigment, and other ingredients are dispersed in a mixture of a solvent and non-solvent in such a manner as to provide a dispersion of discrete slightly solvated particles in the form of a heavy paste. This dispersion can be spread coated with the proper equipment so that a dried film of 10 mils thickness can be laid down in one pass, it was stated.

As advantages and applications of plasticized vinyl resins were listed the infinite range of clear, translucent, and opaque colored compounds that could be had, their superior resistance to oxygen and sunlight aging, their excellent flexing and abrasion resistant properties, their low water absorption, and the flame resistance of properly formulated compounds and their use in cloth coating, as electrical insulation, and in rods and tubes.

Classification of Para Coumarone Indene Resins

THE growing interest in the use of para coumarone indene resins in all types of rubber and plastics compounds has led to a complete revision of the method of identifying the different types of resins and a simplification by reducing the number of resins carried by the Standard Chemical Co., of Akron, O. Two group distinctions are given. One group, light in color with a range of 2-3, carries the name Picco; the other group, dark in color with a range of 12-14, bears the name Bunarex. In each of these groups are three resin types indicated by a number which signifies its melting point in degrees Centrigrade by the ball and ring method. Thus, Picco 10, Picco 25, and Picco 100 signify the light colored resins in the three melting points available, while Bunarex 10, Bunarex 25, and Bunarex 100 identify the dark colored resins in their three respective melting points. If resins of intermediate colors and melting points are required for special purposes, they can be supplied.

Polythene Available Commercially

A NEW member of the plastics family, polythene, adaptable to the manufacture of waterproof coatings, piping, and adhesives and particularly valuable for electric wire and cable insulation, is now available in this country in substantial quantities by specific allocation for war purposes. The commercial availability of polythene, coming originally from Imperial Chemical Industries, Ltd., represents the culmination of intensive experimentation and development undertaken five years ago by the du Pont company. Outstanding properties of this new material include flexibility and toughness over a wide range of temperatures; unusually good resistance to water and to penetration by moisture; chemical inertness; and excellent electrical properties. In thin sections polythene may be classified as non-rigid, although it does not have the rubbery quality that characterizes most non-rigid plastics; while in thick sections it exhibits sufficient stiffness to warrant classification among the more rigid plastics. It may be molded and fabricated by present methods and may be extruded or calendered. In sheet, rod, or tube form it can be machined, cut blown, blanked, or swaged. E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

X-Ray Symposium

THE Polytechnic Institute of Brooklyn and the Metropolitan Section of the American Physical Society plan a symposium on the industrial application of X-ray diffractions to be held at the Polytechnic Institute of Brooklyn, 85 Livingston St., Brooklyn 2, N. Y., on Friday evening, February 25, and Saturday morning and afternoon, February 26. The program is modeled after X-ray symposia held successfully in England for many years prior to the war. Each of the speakers is a leading authority in the United States.

Emil Ott, of Hercules Powder Co., is chairman of the program committee. The subjects to be discussed and the speakers follow: "The Ideas behind X-Ray Diffraction", A. L. Patterson, Bryn Mawr College; "X-Ray Diffraction as a Tool of Metallurgy", C. S. Barrett, Carnegie Institute of Technology; "Diffraction Methods in Analytical Chemistry", L. K. Frevel, Dow Chemical Co.; "Diffraction Methods in Organic Chemistry", J. D. H. Donnay, Hercules Powder; "X-Ray Diffraction in High Polymers", W. O. Baker, Bell Telephone Laboratories; and "X-Ray Diffraction in the Study of Soap", M. J. Buerger, Massachusetts Institute of Technology.

An apparatus and instrument exhibit has been arranged in conjunction with the symposium. Among the exhibitors will be: General Electric X-Ray Corp., North American Phillips Corp., Picker X-Ray Corp., and V. D. Heyde. For any further information on this meeting address Dr. Isidore Fankuchen, 85 Livingston St., Brooklyn 2, N. Y.

Chicago Group Activities

THE Chicago Rubber Group held its annual Christmas Party on December 17 at the Morrison Hotel, Chicago, Ill. About 400 men and women of the Chicago area

(Continued on page 494)

UNITED STATES

Synthetic Rubber Production and Consumption Increase; Revised R-1 Order Issued

Rubber Director Bradley Dewey announced January 12 that production of synthetic rubber under the government program for the fourth quarter of 1943 was in excess of the advance estimate as contained in the "Fourth Progress Report" issued November 10, 1943. Total actual production of all synthetics was 124,219 long tons, as compared with the estimate of 123,300 long tons. Of this, 105,711 long tons of GR-S (Buna S) were actually produced. The estimate here had been for a production of 105,000 long tons.

On the same day a revised WPB Order R-1 was issued which further increased the amount of synthetic rubbers used in various rubber products and further restricted the use of natural rubber and natural rubber latex. Up to 95% of synthetic rubber is now to be used in combat tires of the smaller sizes; the crude rubber content of inner tubes up to a diameter of 10 inches is reduced from 80 to 64%; 100% synthetic treads are to be used on all airplane tires except beaching gear, fighter, and ice grip types; small bogie wheels are now to contain 92% synthetic rubber; tire cord dip after February 1 is to contain 50% synthetic or reclaimed rubber, and compression-type mountings after March 1, 1944, are to contain no crude rubber except for certain types.

Late in the month an order directing nearly all neoprene rubber thread into military channels caused much concern in the garment trade, which had just about completed plans started last fall based on the use of neoprene in place of natural rubber for foundation garments, etc. GR-S has been indicated as a substitute for neoprene, but although some work has been done with this material, the technical work has not progressed to the point where much actual production can be expected for some months.

Synthetic Tires Approved

Information from several sources indicated approval by many users of synthetic rubber tires. Representatives of the U. S. Army Ordnance at a meeting of the Society of Automotive Engineers in Detroit, Mich., January 10 expressed confidence in synthetic tires for military uses based on extensive tests on Army proving grounds and service in combat areas abroad. This report will be found in this issue of INDIA RUBBER WORLD.

The sales research department of the Goodyear Tire & Rubber Co. stated that as a result of a nation-wide survey, 96% of Goodyear synthetic tire buyers reported satisfactory service with their tires. Nearly 5% of the car owners reported driving 20,000 miles; 20% reported driving 10,000 miles, and about half of those reporting had driven in excess of 5,000 miles. Included in this survey was the experience of a large taxicab company in the Midwest which has 1,500 synthetic rubber tires in service. Three hundred of these tires have been removed for recapping after giving an average mileage of 20,000 to 30,000 miles.

Hal Foust, *Chicago Tribune* automobile editor, after covering 27,629 miles with various sets of synthetic rubber tires supplied him by Goodyear and made from GR-S using butadiene from the *Tribune's* pulp mills in Canada, also reported in favor of the synthetic rubber tires. Mr. Foust's itinerary subjected the tires to a variety of weather and road conditions, including the heat and deserts of New Mexico, Arizona, and California, the muddy byways of the Midwest, and the intense cold, snow, and ice of Canada and New England.

British Policy on Indian Rubber Criticized

In an article in *The New York Times* on January 9, attributed to export circles in New York, "sterling area" regulations of the British in India and "joint area" agreements with the United States permitted a situation to develop by which the producers were overcharged for their supplies and underpaid for their rubber. Quoting correspondence from an Indian planter, it was stated that under the "joint area" agreements these plantation operators may not fill their requirements for certain materials, such as copper sulphate, in the United States, but must use British suppliers at a cost approximately double the American market price. The economics of the rubber industry and the heavily increasing cost of production are forcing the planters to cut down the use of supplies essential to the maximum production of rubber, this correspondent added. It was stated that representations had been made to the authorities to permit better prices for rubber, but that the economic aspect had rarely received the proper understanding.

Du Pont Replies to Cartel Charges

A statement was made by W. S. Carpenter, Jr., president of E. I. du Pont de Nemours & Co., Inc., on January 6 in reply to Department of Justice charges of cartel agreements with Imperial Chemical Industries, Ltd., of England, and other European chemical companies.

"The action of the Department of Justice again focuses attention on the existence of so-called 'cartels' involving American companies and European companies. The du Pont company denies that it is now or ever has been a party to any cartel arrangement using the term cartel in its generally accepted sense," Mr. Carpenter said. "The du Pont company has for years had an agreement with Imperial Chemical Industries providing for a mutual opportunity to acquire patent licenses and technical and scientific information relating to the chemical industry. It is asserted unequivocally that this agreement has been of the greatest benefit in giving to the American public products and processes which have materially raised the standard of living. Even more important in connection with the present war effort, the knowledge resulting from this agreement and the products made available as a result of it have been of inestimable value. . . . Surely it cannot be the policy of the Department of Justice to attempt to prevent the continuance and expansion of such immensely beneficial arrangements, which have been a common practice in American industry. But if such be the policy, the du Pont company asserts that it will defend its previous course of action in this regard, firmly believing such action to be in the public welfare and in the interest of national defense."

ODT Investigates Tire Shortages

Joseph B. Eastman, director of the Office of Defense Transportation, on January 23 asked all truck and bus operators to report to his office if they were unable to obtain tire certificates from their ration boards. This action was being taken, it was said, since the tires made available by the Office of the Rubber Director for the first quarter of 1944 failed by substantial percentages to meet the requirements as estimated by the ODT. Mr. Eastman said that the ODT must determine the extent to which the denial of tire certificates, chiefly because of exhausted quotas, threatens to slow down or immobilize essential rubber-borne services and facilities. It was not indicated specifically just what sort of assistance might be given to operators denied tires certificates because of reduced quotas, but it may be that there will be an attempt to distribute tires where most needed in order to give some relief.

URW Expels 74 Workers for Striking

The president of the United States Rubber Workers of America, CIO, Sherman H. Dalrymple, on January 9 expelled 72 tire production workers at the General Tire & Rubber Co. and two mill room workers at Goodyear Tire & Rubber plants for participating in "wildcat" strikes. In a statement at a meeting of union and management officials at General Tire, held to formulate cooperative action against such strikes, Mr. Dalrymple said that further work stoppages would not be tolerated, and expulsions would continue if necessary. Later in January resolutions condemning the expulsion of these workers and demanding their immediate reinstatement were adopted by the various local URW unions in Akron and placed before the executive board of the international union as it went into session on January 21 to consider the matter. It was expected that the executive board of the international would uphold the action of its president in expelling the striking workers. In accordance with the requirements of the maintenance of membership clause of their contract with the unions, General Tire and Goodyear had discharged the expelled workers, and they were also being reclassified by the Selective Service officials.

Port Neches Butadiene Plant Starts

It was announced on January 24 that the first flow of raw refinery gases started through the world's largest petroleum butadiene plant at Port Neches, Tex. The plant, owned by the Defense Plant Corp., is being operated without profit by five large oil companies (Gulf, Atlantic, Pure Oil, Socony-Vacuum, and Texas) and will produce enough butadiene for one-seventh of the government's synthetic rubber program. The plant has a rated capacity of 100,000 tons of butadiene yearly. A mixture of butane-butylene is piped from adjacent refineries to the butadiene plant where the butylene required is separated by fractional distillation and chemical treatment. The butylene is then dehydrogenated by means of superheated steam and catalysts to produce butadiene.

Further Rubber Regulation Revisions

The Office of the Rubber Director is offering to assist all rubber manufacturers to dispose of left-over compounds of natural rubber originally prepared for use in making products now made in large part from synthetics. Manufacturers have been informed that they may submit statements of rubber compounds on hand for which they no longer have permissible use under R-1. All such left-over compounds must be reported, particularly those containing more than 1,000 pounds of natural rubber. In requesting the reports ORD has stated that it will endeavor to assist the individual rubber manufacturers to dispose of the compounded material. It is anticipated that the channeling of these stocks from inventories into permitted uses will conserve substantial amounts of natural rubber.

Amendment 3 (December 24) to Rubber Order R-1, as Amended December 4, 1943, transfers control of original-equipment pneumatic tires for farm machinery from the WPB's Farm Machinery and Equipment Division to the ORD. The amendment imposes no new limitations on producers seeking to obtain tires for newly manufactured agricultural equipment. It represents simply an administrative action whereby an existing arrangement between ORD and the Division of Farm Machinery is formally recognized by incorporation into the basic rubber regulations. The types of newly manufactured farm machinery covered by Amendment 3 are: wheel-type tractors including garden type; combines; pick-up hay balers and field hay harvesters; corn pickers; power sprayers over 10 gallons per minute.

As a result of the new amendment, the identical restrictions previously contained in Orders L-257 and L-257-a are now voided. However tires and tubes already authorized for farm machinery under L-257 and L-257-a will not be affected.

On December 29 the ORD announced a month's extension of the period within which shoe manufacturers could continue to use natural rubber shoe-cements they had in stock. By February 1, 1944, all remaining stocks of such cements must be reported to the ORD in accordance with the program to convert the shoe manufacturing industry to the use of synthetic rubber cement. During the month's period of grace all stocks of natural rubber cement could be used only in accordance with regulations earlier established by the ORD. Synthetic rubber cements are already available as substitutes for the natural rubber cement being eliminated as a wartime measure.

ORD also announced two other amendments to the rubber regulations. One prohibits the use of crude rubber or natural latex in the manufacture of X-ray cables (high-voltage) after February 1. A second amendment makes provision for the manufacture of tire-repair materials on a production preference-basis identical with that established for the production of camelback.

The changes announced December 29 are in the form of an amendment to Appendix 3 of Order R-1, as amended December 18, 1943.

Then on January 13, ORD announced it had published a revision of R-1 and Appendixes that provides a unified compilation of all rubber directives and amendments issued to date. This compilation includes also a number of new provisions reflecting progress in the nation's conversion from crude to synthetic rubber. Among these provisions are the following:

Combat Tires. Conversion of combat tires from 30% to as high as 95% synthetic rubber is now provided. The conversion of combat tires to synthetic rubber will not affect the larger sizes of combat tires, still to be manufactured from crude rubber.

Large Inner Tubes. A 20% reduction in the crude rubber content of truck tubes of 10.00 cross-section has been provided. Formerly a maximum of about 80% crude by volume was permitted. The maximum now permitted is approximately 64% crude.

Rayon Tire Cord. Sufficient rayon tire cord is available to permit its use in city bus tires and in inter-city truck tires. Previously such tires had to be made of cotton cord.

Tire Patches and Reliners. Scrap tires (except light-colored carcass) may now be purchased for the manufacture of tire patches and reliners, through normal trade channels.

Rubber Gloves. The sale of rubber gloves to a consumer for household use can be made only upon presentation of a doctor's prescription.

Airplane Tires. 100% synthetic treads are now provided for all airplane tires, except beaching gear, fighter, and ice grip tires.

Small Bogie Wheel Tires. These tires, used on such military vehicles as light combat tanks, are now converted to 92% synthetic rubber.

Cord Dip. Effective February 1, manufacturers must use a cord dip composed of about 50% synthetic or reclaimed rubber.

Street-Car Sandwich Wheels. This equipment is to be made only from synthetic rubber after February 1.

Vibration Mounts and Dampers. No crude rubber is to be used in the manufacture of compression-type mountings after March 1, except for certain special types in which synthetic rubber has not yet proved entirely satisfactory.

Long Range Field Wire. Only synthetic rubber is to be used in Type W-143 after February 1.

Milking Equipment and Equipment Used in the Handling of Milk. Use of crude rubber in the manufacture of such items is prohibited.

Proofing Compounds. Such compounds may now be made only from reclaim.

Elastic Webbing. It may now be made only from reclaimed rubber.

Covering for Crab-Trap Frames. Permission is now given for fishermen to use synthetic inner-tube scrap on crab-traps.

Curing-Vent Overflow on Airplane Tires. Manufacturers now may clip or shear this material from airplane tires. The operation of removing curing-vent overflow was previously prohibited by ORD to increase tire production, but the regulation has been relaxed at the request of the armed services in the case of airplane tires only.

Washing Machine Drain Hose. Such hose, previously prohibited, may now be made from low-grade reclaimed rubber.

Synthetic Tubes and Tubing. Additional provision has been made for the use of such equipment for medical, surgical, veterinary, and mortuary uses.

Scrap Rubber Transactions. Scrap rubber has been subject to the control of Rubber Reserve Co. Since January 1, however, Rubber Reserve has no longer purchased scrap rubber owing to the fact that a sufficient stockpile of scrap was on hand. The basis of Rubber Reserve's control over scrap rubber has been a provision in R-1. The provision is now cancelled.

Destruction of Scrap Rubber. Restrictions on destroying scrap rubber have been removed since the stockpile on hand is regarded as adequate.

Restrictions on the sale of multiple-jacket cotton rubber-lined fire hose are eased and restrictions on the sale of linen or flax tow fire hose and on cotton outer jackets for fire hose are removed under General Limitation Order L-39, as Amended January 21, 1944—Fire Protective, Signal and Alarm Equipment. The sale of any new cotton rubber-lined fire hose is permitted to fill purchase orders bearing a rating of AA-5 or better. Formerly, in addition to the AA-5 rating restriction, sales of multiple-jacket cotton hose were permitted only to fill purchase orders for specified uses or upon WPB authorization. All restrictions except the requirement of an AA-5 or better preference rating have been removed.

A change in operations, in the processing of applications for tire retreading, recapping, or repair equipment in excess of $85 retail value, was announced January 17, but the policy guiding the approval of applications remains the same. Beginning January 24, applications for these items will be filed with the WPB field offices rather than with the ORD at Washington as heretofore, in keeping with WPB's over-all decentralization program. There are two exceptions. Applications for full-circle molds and matrices for recapping airplane, earth mover, road grader, or rear wheel tractor tires and those involving direct purchases by the armed forces or for export shall continue to be forwarded to the ORD at Washington. The allocation of tire retreading, recapping, and repair equipment is controlled by authorization on WPB Form 2521 (formerly Form PD-840) under Limitation Order L-61, which controls not only new equipment having a retail value of more than $85, but also curing bands and full-circle and sectional matrices regardless of retail value.

Recappers assigned an AA-2 rating for maintenance, repair, and operating supplies under the terms of Controlled Materials Plan Regulation 5 will continue to apply this rating for the acquisition of new retreading, recapping, or repair equipment to the extent that specific authorization is not required by L-61. This means that the Maintenance, Repair, and Operating Supplies rating may be used for minor items of capital equipment having a retail value of less than $85, except curing bands, full-circle and sectional matrices subject to L-61 authorization.

As in the past, applications for the expansion of tire recapping facilities will be granted or denied on the basis of geographical necessity.

Other Changes on WPB Orders

Cotton yarns and fabrics, essential to the conduct of the war as well as the welfare of America and the United Nations, were the subject December 24 of further WPB action, expressed by amendments to Orders L-99 and M-317 and the revocation of Orders L-99-a, M-134, and M-207. Such action is expected to have far-reaching effect in improving the distribution and facilitating production of those essential items. The amendments to M-317, designed to provide for a proportionate distribution of all preference rated business, embody two types of schedules. In M-317, as now amended, the AA-1 Preference Rating Schedule covers yarn, twine, and tire cord only. The AA-2X Preference Rating Schedule is similar in content to the original AA-3 schedule as issued on August 16, 1943. It has been extended, however, to include yarns and twines as well as fabrics, and several additional end uses, the most important of which is

surgical dressings, heretofore covered in Order M-134, and now revoked. The AA-4 Preference Rating Schedule is, for the most part, a replacement of Order M-207, covering work clothing, although such items as footwear, diapers, and sanitary napkins are also included. The AA-5 Preference Rating Schedule covers hospital equipment, book binding cloths, artificial leather, and coated fabrics and various laundry and dry cleaning supplies.

Amendments to L-99 add a new Schedule C, which controls looms on all plain print cloths of 80 sley or more and tobacco and bandage cloths; a new Schedule D, which replaces the spindle control of Order L-99-a with a less stringent regulation of those spindles engaged in the production of sale yarn, twines, etc.

General Conservation Order M-356, as Amended January 10, 1944—Synthetic Fibers, Yarns and Fibers—places under its coverage rayon fabrics.

Conservation Order M-353, as Amended December 24, 1943—Titanium Dioxide—now also includes barium and calcium base extended titanium pigments and titanated lithopone.

General Preference Order M-11-a, as Amended December 29, 1943—Zinc Oxide—places lead-free zinc oxide under allocation and lists its permitted uses. The amended order exempts deliveries of two tons or less. This exemption, it is estimated, will affect only about 5% of the total amount produced. The permitted uses cover not only the quantities under allocation, but also shipments of two tons or less.

Allocation Orders M-203—Phthalate Plasticizers—M-183—Phosphate Plasticizers—M-227—Copper Chemicals—and M-287—Chemicals—and General Preference Order M-190—Calcium Carbide—all, as amended January 6, liberalize small order provisions.

Among the WPB Personnel

Atherton Lee, chief of the Natural Rubber Section of the ORD, resigned December 31 to enter private business. Mr. Lee served in the section for a year, in charge of the work of reviewing and evaluating programs for getting natural rubber into production. From November, 1941, until he joined the ORD, Mr. Lee had been a co-director of the Agricultural Division of the Office of Coordinator of Inter-American Affairs. Mr. Lee also has had a long and successful career with the United States Department of Agriculture.

Fred K. Taylor, of Taylor Instrument Cos., Rochester, N. Y., is a member of the Industrial Thermometer Industry Advisory Committee.

Maury Maverick has been appointed vice chairman of the WPB in charge of Smaller War Plants Corp. and a member of the board of SWPC. Mr. Maverick had been serving as chief of the Government Division of WPB, which he organized shortly after the inception of the War Production Board.

Clinton Rector has been made chief of the Plastics Section, Chemicals Branch, to succeed Frank H. Carman, who has joined the Plastics Materials Manufacturers Association.

Theodore Haschks and R. E. Demmon, both of Stauffer Chemical Co., New York, N. Y., are members of the recently formed Boric Acid Industry Advisory Committee; while John Walsh, of American Cyanamid & Chemical Corp., New York, and Ralph B. McKinney, of Hercules Powder Co., Wilmington, Del., are on the Casein Importers Industry Advisory Committee.

OPA Again Revises Footwear and Tire Orders

New ceilings for waterproof rubber footwear were established for manufacturers and wholesalers by Amendment 7 to MPR 132—Certain Rubber Footwear—effective January 20. This footwear has been produced in recent months with an increasing substitution of synthetic for crude rubber and reduced amounts of reclaimed rubber, causing a change in type from the strictly Victory Line footwear, made from a combination of crude and reclaim, manufactured following the outbreak of war. Because of demonstrated increased costs of this new type of footwear—combining synthetic, crude, and reclaimed rubber—the new ceilings provided manufacturers are approximately 8.9% over Victory Line maximums heretofore observed. But OPA expects that footwear combining the synthetic rubber and using less reclaimed will more nearly approach the wearing quality of pre-Pearl Harbor footwear than did the Victory Line product.

Before the war began the principal constituent of this footwear was crude rubber. When the Victory Line was manufactured to conserve crude rubber supplies, the ceilings established were approximately 5% below standard quality prices in effect November, 1941. The new ceilings are, with a few minor exceptions, at or below the prices in effect during November, 1941, for comparable footwear, which in most cases was of standard quality.

The increases allowed are necessary to maintain production and are the minimum required by law. The industry had asked for substantial increases in ceilings, claiming that, while synthetic rubber was 4¢ a pound cheaper than crude, this did not compensate for increased processing costs. It was further contended that other increases in cost, resulting largely from less efficient labor, made it impossible to absorb the cost increases.

Investigation by OPA into the costs of companies producing more than 75% of all waterproof rubber footwear revealed that on the average factory costs had risen 37% between October, 1941, and September, 1943, with total costs up 35% in the same period. Substitution of synthetic rubber increased average factory costs 19% and total costs 17%. The cost study showed further that the firms accounting for 35% of the production would suffer a loss on footwear produced by them unless allowed to increase prices. In the case of one item, representing 30% of total production, the industry on the average was not recovering costs. By October, 1943, the industry was using 80% synthetic rubber to 20% crude rubber apart from varying amounts of reclaim. It was estimated that on the basis of this rapid rise in costs the industry's total profits before income taxes for 1944 would be 56% less than the average earnings in the period 1936-1939.

Many meetings were held with the Waterproof Rubber Footwear Industry Advisory Committee to discuss the extent to which price increases should be granted. The final determination was designed to cover the costs of approximately 90% of production by volume.

Wholesalers of this footwear may pass on the higher prices granted manufacturers. This action is covered by a provision that wholesale maximum list prices are the same as those of manufacturers, subject to all customary wholesale discounts, allowances, and differentials. The normal practice in the industry is for manufacturers and wholesalers to use the same list prices, from which discounts are given. OPA said that this customary practice can be followed by wholesalers until specific dollar-and-cent ceilings can be determined.

OPA, also studying the problem of new retail ceilings, plans to adjust retail prices after consultation with the industry. Meanwhile retail ceilings will be unchanged. As stocks on shelves of retailers have been bought at the Victory Line prices, this will cause no hardship to the retail trade.

In another action OPA established dollar-and-cent wholesale and retail ceilings for canvas-topped rubber-soled shoes of vulcanized construction, including tennis and basketball shoes, the production of which was recently permitted after a lapse of a year and a half. Manufacturer ceilings for these shoes were established December 9, 1943. The new distributer ceilings are at levels existing in the Fall of 1941 for standard quality items. Five groups of ceilings are provided at retail, depending on the purchase price of the store. All ceilings give a retailer a margin of about 38.7% for the most important discount group in any given class. Industry was consulted about these ceilings. The retail ceilings range from $1.20 a pair for children's untrimmed circular vamp oxfords sold by a Class Five store to $3.75 for a pair of men's training shoes, backed uppers, sold by a Class One store.

At the same time the title of MPR 229 was changed to "Retail and Wholesale Prices for Certain Rubber Footwear", and a number of purely formal changes were made, effective January 26, in the body of the regulation incident to the change in title and coverage. The title had been "Retail and Wholesale Prices for Victory Line Waterproof Rubber Footwear." (Amendment 9.)

Amendment 8 to MPR 132 officially corrects the effective date of Amendment 7, which had originally appeared as January 26, but was then changed to January 20.

Amendment 2, MPR 477—Sales of Rubber Heels and Soles in the Factory and Home Replacement Trades—effective January 7, sets maximum retail prices of 10¢ and 15¢ a pair for rubber heels sold to consumers who will attach them to shoes in their own homes. Heretofore such heels, mainly sold by "five- and ten-cent" stores and hardware shops, were subject to General Maximum Price Regulation on all sales, with the highest March, 1942, prices as their ceilings, which the new ones approximate. The amendment also covers ceilings for sales of these heels at wholesaler and manufacturer levels, at 60¢ to $1.35 a dozen pairs, the wholesale ceilings, and 45¢ to $1.05 a dozen pairs for the manufacturer ceilings.

Rubber soles for attachment to shoes by the purchaser continue under GMPR for the time being, but OPA hopes to create specific ceilings for them soon.

Flat cord rubber soling slabs for shoes, including those of low-grade friction scrap, were provided with dollars-and-cents ceilings, on sales by manufacturers to the shoe factory trade, by Amendment 3 to MPR 447, effective January 26. As the industry is making "low-grade" friction slabs for the first time, ceilings will be subject to review after additional production experience has been gained and fuller information is available as to costs. Previously flat cord rubber soling slabs had "freeze" ceiling prices, based on March, 1942, levels. The new ceilings are for eight different thicknesses and three different sizes of slabs. These prices are related to those already established for composition soling slabs in the same ratio as the prices of flat cord soles are related

to the composition sole prices. The ceilings range from 85¢ for a five-iron slab 24 by 24 inches to $2.70 for a 14-iron slab 31 by 31 inches.

At the same time OPA provided that ceiling prices now applicable for standard carbon-black soles shall also apply to the small sizes of full soles cut out of fuel cell, belt and hose scrap, which are also being manufactured now for the first time. This action also will be subject to review later when full production costs are available.

The definition of rubber in MPR 447 was also changed to include balata rubber. This was the original intent and the regulation has been so interpreted, but balata rubber has now been specifically included to avoid any possible confusion.

Exemption from price control of new rubber tires and tubes made wholly or partly of Buna S, when sold to the federal government, was extended indefinitely from the prior date of January 15 by Amendment 8 to MPR 119—Original Equipment Tires and Tubes—and Amendment 5 to MPR 415—Certain Federal Government Purchases of New Rubber Tires and Tubes. It was stipulated, however, that the exemption automatically will end on the effective date of OPA action setting ceiling prices for these tires and tubes. The amendments do not affect private consumers, but are limited to government purchases of new rubber tires and tubes of Buna S, either separately or as original equipment of vehicles. On sales to private consumers ceilings continue to be provided in RPS 63—Retail Prices for New Rubber Tires and Tubes. Since production of synthetic tires and tubes has been in the experimental stage, sales to the government, heretofore the principal buyer, have been exempted from price control until OPA has enough data on which fair and equitable ceiling prices can be determined.

The following amendments were issued recently to RO 1A—Tires, Tubes, Recapping and Camelback. No. 64, effective December 29, 1943, covers the transfer, without certificate, of tires or inner tubes to and from the Reconstruction Finance Corp. or its subsidiaries. A dealer or a manufacturer, furthermore, receiving scrap tires under this amendment must within 10 days notify the OPA of the number received and must not dispose of such tires for 30 days after this notification unless the tires have been inspected and approved for disposal by an OPA tire examiner.

According to the next amendment, effective December 31, tire dealers who had in stock at the year-end less than six passenger-car tires and no truck tires or tubes did not have to file the quarterly inventory report called for on December 31.

No. 66, effective January 21, makes ration-free when bought for non-vehicular use single-tube and straight-side pneumatic industrial-type tires of the following sizes: up to and including 4.50-12; 6.00-9; 7.50-10; 7.50-15 (four-ply smooth tread only); and 9.00-10; also ration-free are tubes designed for use within these tires. The amendment further removes from rationing all solid tires because the number being produced (400-500 a month) is very small and there is little possibility of their being used on ineligible vehicles. Besides tires or tubes needed for special uses in industrial and other operations, such as tubes being used in blasting to cushion explosives being lowered into a hole, may now be procured by certification from OPA'S national office. Previously no provision existed covering securing tires and tubes for such purposes; so an administrative exception order had to be issued in each instance where it was shown that the proposed use would benefit the war effort.

Amendment 3 to RO 1C—Mileage Rationing: Tire Regulations for the Virgin Islands—covers eligibility for obsolete type and spare tires and of animal-drawn vehicles. Amendment 4 provides that an applicant whose vehicle is essential to the war effort or the community may be issued a certificate for a Grade I tire upon approval by the Director, if recapping services or Grade III tires are unavailable.

The continuing shortage of new tires and tubes was reflected in the rationing quotas for January, which marked the beginning of the third year of rationing these commodities. The quota for new truck tires is down 13,890 from the December quota; while the quota for new truck tubes is 27,787 under the December figure. These reductions are in line with the policy of rationing the number of tires being currently manufactured for civilian consumption. Similarly, a lessening in demand which usually occurs during the colder months accounts for a lower January quota for farm tractor and farm implement tires and tubes. A comparison of January and December quotas follows:

January	Passenger and Motorcycle	December
645,345	Grade I (New)	581,373
829,425	Grade III (Used and Reclaimed)	829,350
645,325	New tubes	645,477
	Truck and Bus	
276,629	New tires	290,519
230,400	New tubes	258,187
	Farm Tractor and Implement	
27,600	Tires	32,200
23,000	Tubes	32,200

Other Price Revisions Affecting Rubber Products

Amendment 9 to RPS 87—Scrap Rubber—effective January 6, authorizes a ceiling of 8¢ a pound, delivered, for pneumatic casing carcass fabric prepared for use in the manufacture of auto tire patches and reliners or as material for shoe soles. This price is in line with the economic value of the carcass fabric and makes allowances for specific production costs involved in sorting old tires, splitting the fabric from the casing, and cutting to manufacturers' specifications. Previously carcass fabric had not been specifically priced by OPA except as miscellaneous scrap rubber, for which the maximum price was ¾¢ a pound. Up to the time of Amendment 9 specific prices were not needed, for the transactions to which the new prices apply had not been allowed.

The amendment further reveals a procedure for pricing rubber scrap where extra sorting and handling are involved. In sales of specially sorted articles of scrap rubber, other than tires, tire parts, or tubes, when sold to a consumer for use in the manufacture of a product other than reclaimed rubber, the seller may submit a proposed price to OPA for approval. Previously no premium had been provided for a dealer who sorted such material, and submission of a proposed price now permits the dealer to apply for such a premium.

Whenever manufacturers of mechanical rubber goods have to pay Defense Supplies Corp. more money for a material than they would normally pay a regular source of supply, they may add the difference in cost to their ceiling prices, according to Amendment 16 to MPR 149—Mechanical Rubber Goods—effective January 14. Only critical war materials would be purchased in this way. The added cost would be to compensate the DSC for extra handling charges incurred in purchasing and reselling the material. These materials, not now available from the regular source of supply, will represent a very small percentage of manufacturers' requirements. Since only critical war materials are involved, the cost of living to the public will not be affected by the action, taken solely to facilitate the output of war goods. War industries are the customers of these manufacturers, and the increases they will have to pay because of the provision will vary, depending on the material.

Amendment 16 also specifies that the mechanical rubber goods regulation applies to the covering of items with rubber. Previously the regulation had been interpreted consistently to include such operations. OPA now explicitly states that all these operations, including the covering of rolls and the lining of tanks with rubber, are under the regulation.

OPA also wrote into the regulation a provision permitting manufacturers to add to the ceilings for neoprene or "Thiokol" hose the extra charges they had in effect October 1, 1941, for cutting these two types of hose into short lengths or for performing any other operation associated with the manufacture of such hose for which they had an extra charge in that base month.

Reductions in ceiling prices of ear and ulcer syringes and double-end bulbs made of neoprene are covered in Amendment 13 to MPR 300—Maximum Manufacturers' Prices for Rubber Drug Sundries—effective December 31. The reductions followed a study of production costs and consultation with the Rubber Drug Sundries Industry Advisory Committee and are made at the manufacturing level, but will be carried through to the consumer as the wholesale and retail ceilings for these items are based on percentage markups over cost. Previously all neoprene double-end bulbs and ear and ulcer syringes had differentials over natural rubber bulbs of 5¢ each, regardless of size. The new differentials are 3¢ each for such bulbs and syringes under three ounces in size, and 4¢ for the three-ounce size. The differential of 5¢ each is continued for the four-ounce size of these bulbs. The new ceilings, as well as ceilings for all other neoprene bulb goods, are to remain in effect until June 30, 1944. The ceilings for such goods have been on a temporary basis and were to have expired December 31, 1943.

Applications for adjustment in ceiling prices can be filed by essential producers of certain essential rubber druggists' sundries who can meet specified conditions, under Amendment 14 to MPR 300, effective January 19. Applications can be made only by a producer whose output cannot reasonably be expected to be replaced at a price lower than the proposed adjusted ceiling, or one who has entered into, or proposes to enter into, a war contract or sub-contract. An application can be made only on a product which contributes to the effective prosecution of the war. These conditions, added last June to the mechanical rubber goods regulation, are embodied in full in the drug sundries regulation. OPA said it may make an adjustment in the ceiling price where it finds that the ceiling is such that, taking into account the costs, profits, and nature of the business, production is impeded or threatened, and that the adjustment will not cause an increase in the cost of living.

Manufacturers may file adjustment applications where they believe the specified conditions would exist if the National War Labor Board should grant a pending application for wage increases.

An adjustment also may be granted where the manufacturer agrees to make a

reduction in the selling price of another commodity, or commodities, which will equal or exceed the total dollar amount of the adjustment requested.

Manufacturers may contract or agree on higher than existing ceiling prices for deliveries made during the pendency of an application for adjustment, but no payment higher than prevailing ceilings may be received until the application is finally disposed of, and then the price received must not be higher than the new ceiling set by OPA.

Changes in MPR 478—Coated and Combined Fabrics—to clarify its coverage, reduce reporting requirements, and adapt further the regulation to industry pricing practices appear in Amendment 1, effective January 19. These changes were recommended by the industry advisory committee for these products, and do not affect the general level of prices. The changes follow:

1. Manufacturers who sold on a list price and discount basis during the base period may compute their ceilings to preserve this practice. Heretofore they had to adjust their ceilings to each class of purchaser by the same dollar-and-cents amount. The base period for civilian goods is March, 1942, and for certain specified military fabrics and services, April, 1943. Where the fabric or service was not supplied or delivered during April, 1943, on the military items, the period from May 1, 1942, to April 30, 1943, can be used.

2. All bookcloth and all window shade cloth are bought under MPR 478. Previously only coated cloths of this type were covered; the others were under the General Maximum Price Regulation.

3. Finished products, cable wrapping tape material, and barrage balloon cloth are excluded from MPR 478. Finished products have never been under the regulation, but to avoid confusion they have been specifically excluded. These finished products are covered by various other regulations. Cable wrapping tape material is now covered by MPR 220, and barrage balloon cloth now will be exempt from price control.

4. The base period for coated and combined fabrics to be used for military purposes is changed from April, 1943, when the fabric or service was not supplied during that month, to the period May 1, 1942, to April 30, 1943. This change will eliminate the necessity of considerable formula pricing.

5. The deduction required from the April, 1943, base level of manufacturers' prices to reflect lowered cost of substitute rubber need not be made if the manufacturer had voluntarily reduced his price to the required extent before April 1, 1943.

6. The fabric or service used as a basis for determining gross margin in the regulation's formula must be subject to the regulation.

7. The definition of factory overhead is clarified in order to show that selling and general administrative expenses are not included.

8. In three ways reductions are made in the number of reports to be filed with OPA. The dollar volume of orders received before a report is necessary is raised from \$50 to \$1,000 in the case of fabrics, and from \$50 to \$500 in the case of services. Secondly, reports are required of recomputed ceilings only where the recomputation results in a higher ceiling and the manufacturer elects to charge a higher price. Thirdly, where the manufacturer does not elect to raise his price on a substitute fabric or service, a report no longer is necessary.

9. Maximum prices are established on rejects and seconds. Government rejects will have ceilings of 90 or 75% of the ceilings for first-quality fabrics, depending on the type of reject. Civilian seconds will be priced in accordane with the manufacturers' customary practice of discounts for seconds.

10. Quotations of prices may be changed from f.o.b. to a delivered basis, or vice versa, by adding or subtracting transportation costs.

Amendment 4 to RPS 31—Acetic Acid—effective January 8, sanctions an increase of 25¢ per 100 pounds in the producer's ceiling for tank car sales of acetic acid produced from fermentation ethyl alcohol in California.

EASTERN AND SOUTHERN

H. Walter Grote

Grote to Wilmington Chemical

H. Walter Grote, associated with United Carbon Co., Inc., Charleston, W. Va., as technical representative and supervisor of laboratories since 1932, has resigned that position to accept an appointment as technical sales representative of Wilmington Chemical Corp., 10 E. 40th St., New York, N. Y. He will service the Midwest from Akron, O., offices. Previous to joining United Carbon, Mr. Grote was connected with The Murray Rubber Co., Trenton, N. J., The Ten Broeck Tyre Co., Louisville, Ky., and The United States Rubber Co., Detroit, Mich. He will make his home in Akron.

North American Philips Co., Inc., Dobbs Ferry, N. Y., with executive offices at 110 E. 42nd St., New York, has purchased all assets of its affiliate, Philips Metalix Corp., including grounds and factory at 896 S. Columbus Ave., Mount Vernon, N. Y., equipment, raw materials, and manufactured products. Unfilled orders will be taken over and filled by North American Philips. Philips Metalix Corp. has been manufacturing X-ray tubes and equipment for the medical profession, hospitals, industry, and the government since 1934. It also has been a sub-contractor for North American Philips on electronic equipment, including Searchray (industrial X-ray), electronic measuring devices, and communications equipment. The business will continue as the Metalix division of North American Philips Co., Inc.

Calco Chemical Division, American Cyanamid Co., Bound Brook, N. J., last month purchased from Interchemical Corp. its United Color & Pigment Co. Division in Newark, N. J. United, with manufacturing facilities covering eight acres and employing some 500 people, has been a major factor in the production of organic and inorganic chemical colors. Calco Chemical Division manufactures organic intermediates and dyes, many of which are raw materials for the production of organic chemical colors. The combined production as well as research and technical service facilities is expected to make possible greater contributions to the pigment consuming industries. According to the Calco statement, the new unit will be known as United Color & Pigment Department, Calco Chemical Division, with "no change of management, personnel or policies contemplated."

Comprehensive Fabrics, Inc., distributer of Koroseal for The B. F. Goodrich Co., as the first step in a projected broad program of postwar expansion, has leased the entire sixty-ninth floor of the Empire State Bldg., New York, N. Y., according to the company's president, Joseph A. Kaplan. The lease covers 18,000 square feet of space, and alterations have already begun for occupancy as soon as possible. This space expansion is the company's second since the opening of its original offices in the Empire State Bldg. in December, 1940. Because production capacities for making Koroseal, a polyvinyl chloride compound, have been increased some 500% as a result of wartime demand, unprecedented quantities of the material will be available for civilian products when peace comes, Mr. Kaplan said in explaining the expansion move.

Koppers United Co., Butadiene Division, Kobuta, Pa., has announced that beginning with 1944 the operating agreement between Koppers and Rubber Reserve Co., Washington, D. C., was changed from a vendor-vendee relation to an agency relation, with Koppers now acting as agent for Rubber Reserve.

American Viscose Corp., Wilmington, Del., has awarded the contract for design and construction of an expansion to its Front Royal, Va., plant, which will more than triple its production of rayon tire cord. Construction has already begun, and the new facilities, consisting of modern mill buildings designed to match the existing plant, will be in operation this year. This increase in rayon production capacity is being undertaken at the request of the government to provide Rayflex, one of American Viscose Corp.'s high-strength rayon yarns, for synthetic tires for war use.

Rubber Division Vice Chairman

Present vice chairman—and 1945 chairman—of the Division of Rubber Chemistry of the American Chemical Society is Willis Alexander Gibbons, who is also director of the general development department of United States Rubber Co., 1230 Sixth Ave., New York 20, N. Y., with which he began his successful career in 1912 when he came to its staff as a research chemist. In 1922, with his service interrupted in 1917-1919 by the war, he was put in charge of the research department of the company's General Laboratories and in 1928 was made their director. The next year his title became director of development and in 1938 director of the general development department.

Dr. Gibbons was born in Long Island City, N. Y., on November 1, 1888. He received his B. A. and M. A. from Wesleyan University in 1910 and '11, respectively, and an honorary Sc. D. from his Alma Mater in 1942. He won his Ph.D. in 1916 from Cornell University, where he had been a graduate student and assistant in the chemistry department from 1910 to 1912.

During the other World War, Dr. Gibbons, who was a first lieutenant, C. A., (Reserve), was called to active duty in May, 1917. He then served as assistant military attaché at the American Embassy in London, England, specializing in technical liaison. He next was a captain in the Ordnance Department during 1918-1919. Nor did his definite service to the government end there. Last year he was one of the four men comprising the American Rubber Mission sent by the Rubber Director to the Soviet Union to collect information about Russian chemical and engineering experience in manufacturing synthetic rubber.

This well-known chemist has also taken out about 60 United States and Canadian patents on processes relating to the vulcanization of rubber, latex and its applications, latex thread, etc. Dr. Gibbons is, moreover, the author of many papers of interest to the rubber industry, including those on the T-50 test, electrochemical oxidation of hydrazine, rubber solutions, and chemicals.

He belongs to so many organizations one would be inclined, if one did not know Dr. Gibbons, to wonder how he finds time for them all. But not only does he belong, he is an active member as well. For many years Willis Gibbons has been prominent in the affairs of the Division of Rubber Chemistry, A. C. S. Besides his present office he has also been a member of the crude rubber and executive committees and a chairman of the Committee on Physical Testing, as well as a councilor of the North Jersey Section, A. C. S. The chairman of the New York Group during 1927-28 was Willis A. Gibbons. He was also on the executive committee of the American Section of the Society of Chemical Industry and is a fellow of the New York Academy of Sciences, the Chemical Society of London, the Institution of the Rubber Industry (London), and the American Association for the Advancement of Science. His name, furthermore, is on the rosters of the American Physical Society, Franklin Institute, Society of Automotive Engineers, Alpha Delta Phi, Phi Beta Kappa, and University, Upper Montclair Country, and Gatineau Fish & Game clubs. He is, moreover, a director of Dispersions Process, Inc., Rockefeller Center, New York, and a trustee of Wesleyan University. In 1942 when the Canadian Department of Munitions & Supply, Ottawa, Ont., created a synthetic rubber advisory committee, Willis A. Gibbons was invited to join.


Pach Bros.

Willis A. Gibbons

His home is at 1060 Fifth Ave., New York 28.

Pennsylvania Rubber Co. started rush construction late in December of an addition to its main factory at Jeannette, Pa., which will increase its manufacturing capacity of synthetic rubber truck tires by about 30%, according to P. C. Mathewson, vice president in charge of manufacturing. The new building, which should be completed early this spring, is immediately adjacent to the present main building of the Pennsylvania company. It is of one-story design in accordance with the most recently developed factory construction practice and will provide at least an additional 40,000 square feet of manufacturing space. A mill room addition to provide sufficient processed synthetic rubber for the new truck tire plant is also under construction on the company's premises. This new project will increase the company's synthetic rubber milling facilities by about 30% to keep pace with the needs of the enlarged truck tire production.

Gordon Groth has been named assistant to Howard W. Jordon, Pennsylvania Rubber president. Mr. Groth previously held executive posts with the Carnegie-Illinois Steel Corp. and Simmons Mfg. Co.

Atlas Powder Co., Wilmington, Del., has made R. Max Goepp, Jr., director of organic research, responsible for the pioneering research on organic chemical products, according to M. J. Creighton, director of the industrial chemicals department. Dr. Goepp, who joined Atlas in 1932 as a research chemist, was graduated from Lehigh University and took his doctorate at Oxford University, England. His work has been mainly in the field of carbohydrate chemistry.

Commodity Exchange, Inc., 81 Broad St., New York, N. Y., at its election of officers January 20, reelected Philip B. Weld and Floyd Y. Keeler, president and treasurer, respectively. Le Roy Scheinler was again named governor to represent the rubber group.

The Themoid Co., Trenton, N. J., announced that sales for 1943 totaled \$16,020,610, compared with \$11,956,424 for 1942.

U. S. Rubber Expansion Plans

Herbert E. Smith, president of the United States Rubber Co., 1230 Sixth Ave., New York 20, N. Y., in an elaboration of the reconversion and expansion plans of the company announced at the year-end, further revealed that the organization will spend more than \$25,000,000 to increase the output of its plants. When the expansion program is completed the latter part of 1944, the company will produce 30% more tires in point of tonnage than at any other time. The tires are urgently needed for both military and essential civilian use. The ordinary motorist must bide his time and avail himself faithfully of every tire conservation measure, according to Mr. Smith, although after the war ends the company expects to need and use all its plant facilities for civilian production.

The company's tire plants involved in the expansion program are at Eau Claire, Wis., Chicopee Falls, Mass., Detroit, Mich., and Los Angeles, Calif. A fifth plant, said to be the world's largest for the manufacturer of inner tubes, is at Indianapolis, Ind.

The Eau Claire plant, now in process of reconversion from munitions manufacture to tire making, will start production for the duration on large-size tires by late spring, and capacity will be reached toward the end of '44. Several new buildings are being erected at Chicopee Falls to make the Fisk plant the largest producer of truck tires east of the Alleghenies, with its total tire building capacity double that of its prewar figure. Capacity production is expected in July, and the plant will also make fairly substantial quantities of passenger-car tires, in line with wartime production schedules.

The Detroit plant too is installing additional new tire building equipment and enlarging its facilities for greater airplane tire output. Recently the bullet-sealing fuel cell department was moved to other quarters which the company acquired, in order to convert the space to airplane tire production. Truck tires are likewise being made in quantity here as well as a substantial number of passenger-car tires. The Detroit plant, furthermore, is continuing to put out many other products for the war effort.

New equipment, comprising a million pounds of tire building and new rubber products manufacturing machinery, is being installed at Los Angeles, and when capacity production is attained the latter part of the year, this plant will be able to handle twice the rubber tonnage than previously. Besides the large sized tires for military and essential civilian use, this plant will also turn out passenger-car tires.

On January 1, U. S. Rubber reopened its Denver, Colo., branch at 1513 Wazee St. as distributing point for the U. S. Tire division, according to A. B. Fennell, division sales manager. H. E. Noonan, former district manager at Denver, is in charge.

U. S. Rubber has introduced the theme "Serving through Science" in the new national advertising campaign which it has launched in newspapers, general magazines, and farm papers, according to a recent announcement by T. H. Young, director of advertising. This campaign will also emphasize the saving and protecting of lives through scientific developments and will also be featured in the commercial following the New York Philharmonic radio program, sponsored by the company. Campbell-Ewald Co., New York, is the advertising agency handling the copy.

Synthetic rubber lifesaving suits to give

added protection against oil slicks are now in mass production at the Woonsocket, R. I., plant of U. S. Rubber. These suits are mandatory equipment for all Merchant Marine crews of vessels operated by the War Shipping Administration. Besides the suits possess a special hoist harness which makes it easier to lift oil-covered seamen from the water. The suits also are said to keep the wearers warm and dry; they provide extra buoyancy to that supplied by the life vest worn under them, and they help to ward off sharks. They are made of one piece so that they can be put on quickly. Conversion to oil-resistant synthetic rubber from natural rubber, of which the suits formerly were made, was done without any interruption of production.

News of Company Personnel

Donald J. Brightman was made general sales manager of the textile division of U. S. Rubber last month, reported H. Gordon Smith, division general manager. A native of New Bedford, Mass., Mr. Brightman's first connection was with the Soule Mills at New Bedford, following which he worked in the Pierce and Booth Mills, supplementing his practical experience with night courses at the New Bedford Textile School. In 1913 he went with Greene & Daniels Co., Inc., Pawtucket, R. I., where, except for the period of the last war, he remained until 1919, becoming assistant to the treasurer. Next he joined the Fisk Rubber Co., Chicopee Falls, Mass., and subsequently became manager of the textile division, a position he held for ten years, prior to that company's acquisition by U. S. Rubber in January, 1940.

With the company's greatly expanded operations in the textile field Mr. Brightman will take charge of sales and distribution of all products now being made in the company's five textile mills. These mills, four of which are in the South and a fifth in New England, are engaged in extensive manufacturing for war purposes of tire cord, both cotton and rayon, yarns, ducks, and two of the company's more recent major developments, Asbeston and Ustex.

Assisting Mr. Brightman in the new sales organization are H. E. Sunbury, in charge of Asbeston sales, the lightweight asbestos fabric used extensively in fire-fighting suits; A. W. Hansen, who will direct the sales of Ustex, a high tensile yarn for making parachute webbing; and D. S. Ballou and Marjorie S. Biron, who will continue to handle other types of yarns and related products.

Harry M. Ramsay has resumed the position of assistant sales manager of Fisk Tire division, it was announced last month by J. C. Ray, division sales manager. For the past two years Mr. Ramsay was manager of the company's fuel cell department at Detroit. A native of Boston and a graduate of Harvard, Mr. Ramsay joined the company in 1935 in the tire sales department. He became branch manager of tire sales at Newark, N. J., in 1937, was appointed district manager at Baltimore in 1939, district manager at Chicago in 1941, and later the same year became assistant sales manager of the Fisk division.

John P. Coe, general manager of the Naugatuck Chemical Division, is scheduled to address the New York Institute of Finance on "Synthetic Rubber" on February 7 at 3:30 p.m. in the Governor's Room of the New York Stock Exchange.

After 52 years in the transportation field George F. Hichborn, formerly director of traffic for the rubber company, retired December 31, 1943. Mr. Hichborn began his business career in Boston, Mass., with the Grand Trunk Railway System, with which he was connected for 15 years. On January 1, 1907, he joined U. S. Rubber as general traffic manager and was subsequently appointed director of traffic. For the past year he acted in the capacity of traffic consultant and adviser. On January 3, Mr. Hichborn's New York associates honored him with a luncheon at the Biltmore Hotel. The next day Mr. and Mrs. Hichborn left for an extended stay at Fort Lauderdale, Fla.

Rohm & Haas Co., chemical manufacturer, Philadelphia, Pa., through President Otto Haas has announced a pension plan providing a monthly retirement income for life approximately equal to 40% of the employe's pay, plus increased life insurance during active years. The entire cost of the plan, which became effective December 31, 1943, will be underwritten by the company. The plan applies to all workers, hourly and salaried, with five or more years of service with Rohm & Haas and its affiliates, Charles Lennig & Co. and Resinous Products & Chemical Co.

H. K. Porter Co., Inc., manufacturer of locomotives, process equipment, and pumps, Pittsburgh, Pa., has announced the opening of an enlarged New York and export office at 50 Church St., New York, N. Y. Thomas MacLachlan has been named general manager of the office and in charge of locomotive sales; R. G. Newell will handle the pump division, and Earl M. Bardo will look after the process equipment sales. W. W. Calihan, general sales director, stated that additional district and regional offices were being established throughout the country.

OHIO

Goodyear Announcements

Goodyear Tire & Rubber Co., Akron, now has in operation an expanded schedule of production of tractor and other farm-use tires, according to P. W. Litchfield, chairman of the board. This production gain has been made possible under Goodyear's program for increasing tire output where more than thirty million dollars is being spent in reconverting tire plants that have completed contracts for other types of war production, and in expanding present tire manufacturing facilities.

Then on January 21, Mr. Litchfield reported full completion of the synthetic rubber construction program which his company undertook for the Defense Plant Corp. These facilities have a total annual rated capacity of 150,000 tons and represent a government investment of approximately \$28,900,00. The Goodyear erected plants include a 30,000-ton plant at Akron; a 60,000-ton plant at Houston, Tex.; and a 60,000-ton plant at Los Angeles, Calif., that is part of a 90,000-ton installation, the remainder of which is being operated by the United States Rubber Co.

Harold R. Conn, Goodyear medical director, recently was appointed to survey facilities for the treatment of wounded and injured soldiers in the United States Army base hospitals in the Fifth Area Command. Dr. Conn is one of several civilian consultants in orthopedic surgery to the Secretary of War.

Clem J. Burkley, of the Goodyear tire design research department, recently was awarded the WPB citation of Individual Production Merit for development of an ice-grip tire for military planes engaged in Arctic operations.

Promotion of Thomas A. Knowles to a vice presidency of Goodyear Aircraft Corp. was announced last month by Mr. Litchfield. Mr. Knowles came to Goodyear in 1927 on graduating from Massachusetts Institute of Technology with a B. S. in mechanical engineering. After taking the staff training course at Goodyear, Mr. Knowles was assigned to the tire design department and later received his license as a balloon and airship pilot. He was transferred to the Goodwear Zeppelin Corp., forerunner of Goodyear Aircraft, in 1928, in the research department. Later he made a trip to Germany and studied airship construction at Luftschiffbau, returning to Goodyear Zeppelin as development engineer. From 1936 to 1940 he was in Washington representing the interest of the Goodyear Zeppelin Corp., and American Zeppelin Transport, Inc., working on proposals for the development of over-ocean airship service. Returning to Goodyear Aircraft in January, 1941, Mr. Knowles took over the management of the customer engineering contact department and later became sales manager.

Firestone Tire & Rubber Co. stockholders, Akron, recently authorized issuance of \$60,000,000 in new preferred stock and a change in par value of the common stock from \$10 to \$25 a share. The new cumulative preferred at \$100 par, which carries a dividend rate of not more than 4½%, will be used to retire the \$45,600,000 of 6% preferred stock outstanding. Harriman, Ripley & Co., Inc., and Otis & Co., Inc., which handled the sale, last month announced oversubscription of their offering of 450,000 shares of the new stock.

Firestone has awarded building permits for construction of a new cafeteria, at \$17,000, alterations and improvements to a factory building, at \$25,000, and foundations for machinery at \$4000, at its plant located at 2525 Firestone Blvd., Los Angeles, Calif.

Seiberling Rubber Co. stockholders at their annual meeting in Akron on January 17 reelected the following eight directors: F. A. Seiberling, chairman of the board; J. P. Seiberling, president; C. W. Seiberling, first vice president; H. P. Schrank, vice president in charge of production; J. L. Cochrun, vice president in charge of sales; W. A. M. Vaughan, vice president and treasurer; A. C. Blinn, president of the Ohio Edison Co.; and Robert Guinther, an attorney with Slabaugh, Seiberling, Guinther & Pflueger. At a director's meeting immediately following the stockholders' all present officers of the company were reelected for the year. They are F. A., J. P., and C. W. Seiberling; Messrs. Schrank, Cochrun, and Vaughan; W. E. Palmer, secretary and assistant treasurer; H. E. Thomas, assistant secretary; and C. E. Jones, comptroller.

Chemical Research for Industry, Inc., 2915 Detroit Ave., Cleveland 13, has appointed James W. Yanda general manager in charge of research, chemical development, and engineering.

Goodrich Activities

The B. F. Goodrich Co., Akron, has established manufacturing operations in DuBois, Pa., according to Vice President T. G. Graham. This production unit will manufacture goods in which rubber and textiles are used, it is said. No estimate of the number of workers to be employed was given. A. J. Baker, manager of Akron factory employment, will be plant manager in DuBois. Other personnel will be named later.

Construction work on the new tire manufacturing plant in Miami, Okla., started last month.

A vinyl-resin shoe soling material described as having "almost unbelievable" wear resistance, yet light enough to be an important factor in the "super-light and super-flexible shoe of the future" is being manufactured by the Goodrich company. For the present the product is "war quality" because of the heavy military demand for prime material, but even so in tests by Akron mail carriers it has shown several times the wear resistance of other materials. While the material is suitable for both men's and women's shoes, said F. A. Lang of the shoe products sales division, its main field is expected to be women's footwear because of its style possibilities and because its uniformity lends itself to the precision pattern standards essential in that field. The soling, moreover, can be made in any color desired.

Henry F. Schippel has been named manager of the aeronautical section of the field engineering department of the Goodrich tire division, according to A. W. Phillips, general superintendent of the tire and track division. Mr. Schippel had been on special engineering duties in the company's aeronautical sales division since his return last year from the African theater of war, where he was engineer in charge of rubber products at two large repair and maintenance bases.

R. A. Maxwell has been appointed in charge of all tire sales except airplane in the combined automotive, aviation, and government sales division at Goodrich, it is announced by G. E. Brunner, division general manager. Mr. Maxwell, a graduate of the University of Maryland, has been with the company 10 years, mainly in truck and bus tire sales. He was on leave during last year while serving the Office of Rubber Director in Washington.

L. E. Rohrbaugh has been appointed manager of Goodrich shoe products sales, reported E. F. Tomlinson, general manager of the industrial products sales division. Mr. Rohrbaugh succeeds Fred A. Lang, recently named division merchandise manager, and will have charge of the sale of soles and heels as well as other rubber and plastic products used by the shoe industry. Joining the company as a cost clerk in the Akron offices in 1918, Mr. Rohrbaugh was transferred to industrial products sales in 1932 and had been a salesman in the Philadelphia district since 1934.

Richard W. Corns has been appointed assistant general traffic manager at Goodrich, according to H. J. Zimmerman, general traffic manager. After studying at the University of Akron and the American Institute of Banking, Mr. Corns joined the company in 1934 and was a sales analyst until July, 1941, when he was transferred to the traffic department.

A. C. Sprague, who has been serving as superintendent of personnel at the Lone Star Ordnance Plant, Texarkana, recently returned to Akron to resume his duties as employment manager of Goodrich factory personnel.

Timken Personnel Promotions

A. M. Donze, factory manager of The Timken Roller Bearing Co., Canton 6, for the past eight years, recently became vice president in charge of production, following a board meeting. At the same time H. M. Richey, assistant factory manager since 1940, succeeded Mr. Donze as factory manager. Mr. Donze has been with Timken since 1919. In 1921, after several progressive steps, he became production manager of the bearing factory; in 1934 factory manager; and in 1940 a director of the company.

Mr. Richey joined Timken in 1916, beginning as an assistant foreman.

Walter G. Hildorf, who recently became director of metallurgy for Timken, is the first to occupy that newly created office. He was formerly Timken's chief metallurgical engineer, a position now held by Ralph L. Wilson. Mr. Hildorf, metallurgical veteran of 35 years' experience, came to Timken in 1928, after 20 years' experience with such firms as The Copper Range Consolidated Mining Co. and The Reo Motor Car Co. For three of those years, from 1917 to 1920, he was first an instructor and later an associate professor in the metallurgical department of Michigan State College.

Ervin C. Pope has been elected president of the Cleveland Liner & Mfg. Co., Cleveland, succeeding in that office his father, F. Alton Pope, the founder of the company, who died in July last. Mr. Pope has been associated with the company since 1923 and for 17 years was in charge of production. In 1940, upon the death of his brother, Edward A. Pope, he became sales manager of the company in addition to continued supervision of production, which makes him particularly well qualified to head the business.

MIDWEST

The Meyercord Co., decalcomania manufacturer, 5323 W. Lake St., Chicago 44, Ill., has announced that while large quantities of Elasti-Cals, the rubber nameplate which permits both color and sketch, are being produced, orders can be filled for war products only. This patented decalcomania process, used during peacetime for nameplates, trade marks, and colorful decorations on a wide variety of rubber products and sundries, will not be available for civilian goods until government regulations controlling rubber permit. However the services of Meyercord technicians are available to rubber manufacturers who are already designing postwar products and are desirous of experimenting with Elasti-Cals for either decorations or product identification.

Meyercord is also distributing an informative check-chart showing how to select and specify the right decalcomania nameplate for 16 different types of surfaces. Published in file-folder form to hold subsequent data sheets to be distributed periodically, it also contains a check-list of 25 wartime uses for Meyercord decalcomania now used on 34 different types of combat equipment. The chart illustrates actual Decal nameplates and describes application methods, types, and uses, as well as special features such as retention and shut-off fluorescent, non-specular, mar-proof, and elasticized Decals. Meyercord wartime research has developed or improved decalcomania to result in Decals resistant to acid, petroleum products, alcohol, abrasion, extreme heat and cold, humidity, and moisture that can be applied to any known commercial surface, rough or smooth. Product engineers, designers, and manufacturers interested in new decalcomania developments for nameplates, trade marks, operating instructions, wiring diagrams, etc., can obtain copies of the Decal check-chart from The Meyercord Co., Dept. RT, 5323 W. Lake St., Chicago 44, Ill.

The Gates Rubber Co., Denver, Colo., reports the use of its Vulco rope drives in the solution of a problem of power transmission in a West Coast butadiene plant where three blowers from the Arizona mining district were pressed into service to provide 112,000 cubic feet of air per minute for the operation of this plant. At the speeds at which these blowers would have to operate, one required a 750-horsepower motor and the other two blowers each required two 500-horsepower motors. The sheaves and belts were on the ground by the time the blowers were ready to go in, and the installation of these large drives was made without difficulty or special incident.

Reichhold Chemicals, Inc., Detroit, Mich., through Henry H. Reichhold, chairman of the board, has revealed the promotion of P. J. Ryan to vice president in charge of the Detroit plant. In his new position Mr. Ryan will have complete supervision over all production and technical development at the main plant and also will continue to serve as technical advisor to the directorate. Mr. Ryan, following some ten years' production, development, and research experience in the paint, varnish, and lacquer industry, joined the RCI organization in 1936 and served successively as special technical sales service consultant, director of technical development, production manager, and technical advisor to the chairman.

Michigan Chemical Corp., St. Louis, Mich., has announced that A. M. Byers, for 27 years vice president and sales manager of General Magnesite & Magnesia Co., Philadelphia, Pa., is now in charge of Michigan Chemical sales of light and heavy calcined magnesia to the rubber and allied trades.

CANADA

C. D. Howe, Minister of Munitions & Supply, Ottawa, Ont., announced January 13 that poorer-grade reclaim and scrap rubber now may be used in the manufacture of civilian goods. Mr. Howe defined rubber materials now available for civilian use as "reclaimed and scrap rubber which have a rubber hydrocarbon content of 45% or less of the total weight, and scrap rubber obtained from tire buffing."

S. A. Bibby, of Sarnia, Ont., administrator of housing in Sarnia and Wallaceburg for Wartime Housing, Ltd., announced January 18 that approximately 195 permanent-type homes now have been built to accommodate employes of Polymer Corp., Sarnia. Another 125 are under construction.

FINANCIAL

Firestone Tire & Rubber Co., Akron, O. Year ended October 31, 1943: consolidated net profit, $15,183,382, equal to $6.40 a common share, contrasted with $12,481,130, or $5.04 a share, in the previous fiscal year; sales (a record), $545,389,601, against $352,693,500; depreciation and amortization, $12,409,015, against $10,307,082; taxes, $51,957,601, against $33,620,874; current assets, $181,327,269, current liabilities, $73,606,550, against $146,601,536 and $54,408,643, respectively, a year earlier; cash, $24,511,307, against $13,185,423; inventories, $93,766,250, against $85,725,659.

Lee Rubber & Tire Corp., Conshohocken, Pa., and subsidiary. Year ended October 31, 1943: net income, subject to renegotiation, $1,241,934, equal to $5.14 each on 241,509 capital shares, contrasted with $1,144,765, or $4.74 a share, a year earlier; net sales, $25,236,489, against $18,725,101; federal taxes, $2,583,697, against $1,061,264; reserve for contingencies, $250,000, against $150,000.

Norwalk Tire & Rubber Co., Norwalk, Conn. Year ended September 30, 1943: net profit, subject to renegotiation, $162,165, equivalent to 65¢ a common share, compared with $142,350, or 55¢ a share, in the preceding 12 months; federal taxes, $363,800, against $288,000.

Pharis Tire & Rubber Co., Newark, O. Year ended October 31, 1943: net income, $209,992, or 95¢ a share, against $119,027, or 54¢ a share, in the preceding fiscal year.

Seiberling Rubber Co., Akron, O., and wholly owned subsidiaries. Year ended October 31, 1943: net income, subject to renegotiation, $609,301.36, against $732,928.40, before renegotiation, in the preceding fiscal year; net sales, $18,273,782.41, against $11,681,388.21; current assets, $5,381,847.57, current liabilities, $1,508,225.66, compared with $4,632,092 and $768,877, respectively, on October 31, 1942; taxes, $1,294,200, against $408,759.

A. G. Spalding & Bros., Inc., New York, N. Y. Year ended October 31, 1943: net profit, $502,842, against $262,644 in the year ended October 31, 1942; sales, $11,505,746, against $9,729,756; income taxes, $277,213, against $147,715; postwar reserve, $150,000, against $100,000; current assets, $8,786,610, current liabilities, $1,613,646, against $7,111,276 and $689,765, respectively, on October 31, 1942.

Seiberling Rubber Co. of Canada, Ltd., Toronto, Ont., Canada. Year ended October 31, 1943: net profit, $64,213 equal after depreciation, taxes, etc., to $2.05 a share, contrasted with $92,552, or $2.95 in the preceding fiscal year, earned surplus $330,205, against $272,454; current assets $1,307,726, and current liabilities $1,376,954.

Chicago Group

(Continued from page 485)

attended and enjoyed an excellent floor show and dancing until the small hours of the morning. The committee in charge consisted of J. Sheridan, New Jersey Zinc Co., and H. A. Winkelmann, Dryden Rubber Co., as co-chairmen, and Parker Highsmith, Bibb Mfg. Co., M. Vaughn, Wishnick-Tumpeer, Inc., and W. F. Bernstein, consulting engineer.

The next meeting will be held February 4 at 6:30 p.m. at the Morrison Hotel. The technical program will consist of a paper by John Hendricks, of National Lead Company, who will have as his subject "The Compounding of Buna S for Heat Resistance." There will also be a showing of the latest confidential films which are records of actual battles and will show the sinking of both enemy and Allied ships, dive bombing, torpedoing, etc. A U. S. Navy representative who has been in one or more of the actions shown in the films will be on hand to explain the scenes and answer questions on Naval strategy.

The success of the Chicago Rubber Group annual Christmas party was made possible by the generous contributions of the following companies and individuals:

Advance Solvents & Chemical Corp., Airlastic Rubber Co., L. Albert & Son, American Container Corp., American Resinous Chemicals Corp., American Roller Co., American Zinc Sales, Anchor Rubber Mfg. Co., Anderson-Bolling Mfg. Co., Auburn Rubber Corp., Barrett Co., Bibb, Bill Brothers Publishing Corp., Binney & Smith Co., Samuel Bingham's Son Mfg. Co., Brown Rubber Co., Inc., Carter Bell Mfg. Co., Chicago Belting Co., Chicago Cutting Die Co., Chicago Rubber Clothing Co., Cleveland Liner & Mfg. Co., E. W. Colledge, Commerce Petroleum Co., Continental Carbon Co., Cupples Co., Darling & Co., T. A. Desmond & Co., Diamond Wire & Cable Co., Dryden Rubber, E. I. du Pont de Nemours & Co., Inc., Eagle-Picher Sales Co., B. & B. Enterprises, Farrel-Birmingham Co., Inc., Frost Rubber Works, General Atlas Carbon Division, Genseke Bros., General Latex & Chemical Corp., Godfrey L. Cabot, Inc., R. W. Greef & Co., C. P. Hall & Co., Herron & Meyer, Hub Plating Works, J. M. Huber, Inc., Hycar Chemical Co., Ideal Roller & Mfg. Co., Industrial Rubber Goods Co., Inland Rubber Corp., Douglas P. Johnstone, Judsen Rubber Works, Inc., Keystone Plating Works, Kraft Chemical Co., La Jone Rubber & Mfg. Co., Inc., Lonergan Die Co., Magie Bros., Marbon Corp., Midwest Rubber Reclaiming Co., Monsanto Chemical Co., Moore & Munger, H. Muehlstein & Co., Inc., National Rubber Machinery Co., National Smelting & Refining Co., National Standard Co., Naugatuck Chemical Division, New Jersey Zinc Sales, Palmerton Publishing Co., Inc., Pequanoc Rubber Co., The Philadelphia Rubber Works Co., Pittsburgh Plate Glass Co., Palmer Asbestos & Rubber Corp., Rapid Roller Co., Rex-Hide, Inc., Stamford Rubber Supply Co., Schulman, Inc., Sherwin-Williams Co., Stanco Distributors, Inc., Standard Chemical Co., Stauffer Chemical Co., Inc., Titanium Pigment Corp., Thiokol Corp., United Carbon Co., U. S. Rubber Reclaiming Co., Inc., Van Cleef Brothers, Vanderbilt Co. R. T., Warwick Chemical Company, Wear Proof Mat Co., Western Felt Works, Williams-Bowman Rubber Co., Wilmington Chemical Corp., Wishnick-Tumpeer, and Xylos Rubber Co.

New Group Officers

OFFICERS for 1944 of the Northern California Rubber Group were introduced at the organization's first annual Christmas party held December 20 at Dugan's Theatre Cafe, Emeryville, Calif. Their names follow: president, Leonard Boller, assistant technical superintendent, Pioneer Rubber Mills, Pittsburg, Calif.; vice president, Russell D. Kettering, chief chemist, Oliver Tire & Rubber Co., Oakland, Calif.; and secretary-treasurer, George B. Farwell, partner of Reliance Rubber Co., Oakland.

The party, attended by about 60 guests, was marked by professional and informal entertainment and the showing of motion pictures of the Group's summer outing and that of the Los Angeles Group. Herman Jordan, retiring president, was presented with a handsome desk pad. Also occurred the drawing for a large number of prizes made possible through the generosity of the following concerns:

American Rubber Mfg. Co., E. I. du Pont de Nemours & Co., Inc., Farrel-Birmingham Co., Inc., Goodyear Rubber Co., C. P. Hall Co. of California, Hycar Chemical Co., Oliver Tire & Rubber, Oronite Chemical Co., Pacific Rubber & Tire Mfg. Co., Pioneer Rubber, Plant Rubber & Asbestos Works, Reliance Rubber, H. M. Royal, Inc., and Shell Development Co.

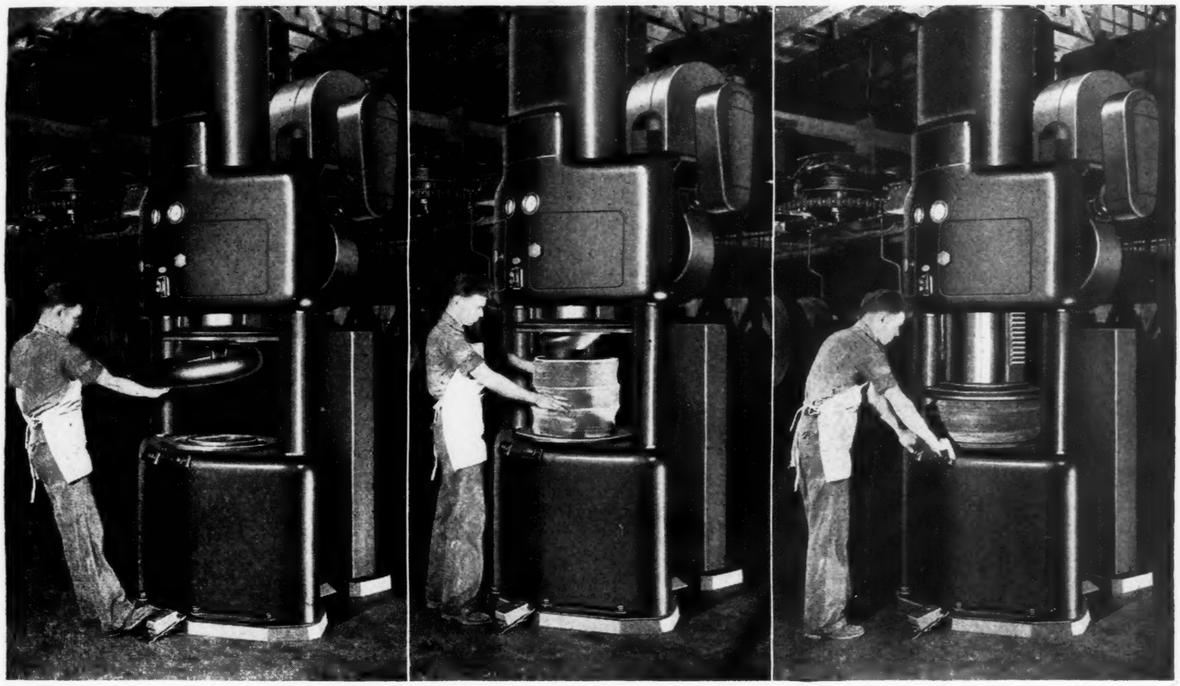
Warwick Chemical Co., West Warwick, R. I., through President Ernest Nathan has announced that Walter E. Murray was elected a vice president at the corporation's recent annual meeting. Mr. Murray joined Warwick Chemical in 1941 as sales manager of the textile chemical department and in October, 1943, was appointed manager of that department. Mr. Murray graduated from Providence College in 1928, when he went to the U. S. Finishing Co. as plant chemist. After four years, he accepted a similar position with Slater Print Works, and then with Eddystone Co. Two years later he became superintendent of Lincoln bleachery division of the Lonsdale Co., but later became assistant technical director for the Pacific Mills.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
Crown Cork & Seal Co., Inc.	Com.	$0.50 q.	Feb. 15	Jan. 19
Crown Cork & Seal Co., Inc.	Cum. Pfd.	0.5625 q.	Mar. 15	Feb. 29
Dayton Rubber Mfg. Co.	A	0.50 q.	Jan. 31	Jan. 15
Dayton Rubber Mfg. Co.	Com.	0.25	Jan. 31	Jan. 15
De Vilbiss Co.	Pfd.	0.175 q.	Jan. 15	Dec. 27
Firestone Tire & Rubber	Pfd. (New)	0.55	Mar. 1	Feb. 15
General Cable Corp.	Pfd.	1.75	Feb. 1	Jan. 22
Goodyear Tire & Rubber Co.	Com.	0.50 q.	Mar. 15	Feb. 15
Goodyear Tire & Rubber Co.	Pfd.	1.25 q.	Mar. 15	Feb. 15
Hercules Powder Co.	Pfd.	1.50 q.	Feb. 15	Feb. 4
Hewitt Rubber Corp.	Cap.	0.25 q.	Mar. 15	Feb. 28
Lee Rubber & Tire Corp.	Cap.	0.75	Feb. 1	Jan. 15
Lima Cord Sole & Heel Co.	Com.	0.10	Dec. 20	Dec. 10
Norwalk Tire & Rubber Co.	Com.	0.20	Mar. 1	Feb. 15
Norwalk Tire & Rubber Co.	Pfd.	0.875 q.	Apr. 1	Mar. 15
Philadelphia Insulated Wire Co.	Com.	0.25 s.	Feb. 15	Feb. 1
A. G. Spalding & Bros., Inc.	Pfd.	1.00	Apr. 15	Apr. 5
S. S. White Dental Mfg. Co.	Com.	0.30	Feb. 14	Jan. 29

Compounding Ingredients Price Changes

DPG (Diphenylguanidine)	lb.	$0.35	/	0.45
Flectol H	lb.	.43	/	.55
Galex	lb.	.065	/	.20
No. 16 Resin	lb.	.60	/	
Santoflex B	lb.	.43	/	.55
BX	lb.	.54	/	.64
Santovar-O	lb.	1.15	/	1.40
"Thiokol" Type "A"	lb.	.35	/	.45
"FA"	lb.	.50	/	.60
Latex (Water Dispersions)				
MF	lb.	.70	/	.80
MX-3112	lb.	.65	/	.75
WD-2	lb.	.75	/	.85
TP-10	lb.	.55	/	.75
90-B	lb.	.55	/	.65
Witcarb	ton	10[illegible].00	/	
R-12	ton	50.00	/	



Patents and Trade Marks

APPLICATION

United States

2,337,036. **Resilient Mold of a Plasticized Polymerized Vinyl Halide in the Form of a Soft and Highly Elastic Gelled Material.** R. W. Erdle, assignor to Dental Research Corp., both of Chicago, Ill.

2,337,211. **Knitted Fabric Having Alternate Courses of Inelastic and Elastic Yarn.** E. St. Pierre, Pawtucket, assignor to Hemphill Co., Central Falls, both in R. I.

2,337,218. **Plug for a Lug Strap Including a Body Section Having a Roll of Fabric Loaded with Vulcanizable Material and an Impact-Receiving Section of Rubber.** H. E. Wilson, assignor to Lambeth Products Corp., both of Antrim, N. H.

2,337,318. **Rubber Submersible Boat.** H. Eliuk, Peabody, Mass.

2,337,525. **Floor Mat to Reduce the Vibration of Vibrating Panels, Consisting of a Body Portion Having Attached to Its Lower Side Projections of Rubber.** P. G. Peik, assignor to General Tire & Rubber Co., both of Akron, O.

2,337,556. **Cable Including a Monel Metal Wire Uniformly Coated with Vulcanized Rubber Substance on Its Exterior and a Monel Metal Tube Surrounding the Rubber Coating and Directly Bonded thereto.** O. W. Hosking, Monroe, N. Y., assignor to Composite Rubber Products Corp., Bridgeport, Conn.

2,337,618. **Cable Unit Having a Molded Resilient Rubber Body in Which Terminals and Connected Portions of Conductors Are Imbedded.** J. B. Miller, Webster Groves, assignor to Mines Equipment Co., St. Louis, both in Mo.

2,337,639. **Fluid Sealing Unit for a Relatively Movable Shaft and Bearing Having a Rubber-Like Sleeve.** O. Brummer, Oak Park, assignor to Crane Packing Co., Chicago, both in Ill.

2,337,883. **Pneumatic Ticket Receiving Valve Having Two Mounting Plates, Each with a Recess and a Rubber Mounting Fitted in Each Recess.** E. W. Gent, Morristown, N. J., assignor to Bell Telephone Laboratories, Inc., New York, N. Y.

2,337,953. **Telephone Headset Including a Headband, a Receiver and a One-Piece Soft Rubber Member.** R. E. Wirsching, Packanack, N. J., assignor to Bell Telephone Laboratories, Inc., New York, N. Y.

2,338,066. **Single-Piece Unsplit Tire Rim and a Pneumatic Tire Having Spaced Annular Edges, Each with a Single Small Diameter Wire Extending Throughout Its Length.** A. C. Weston, Santa Barbara, Calif.

2,338,308. **Threshing Machine Having a Pair of Upper and Lower Cooperative Rotatable Rolls, the Upper Roll Having a Rubber Surface, and the Lower a Metal Surface.** H. C. Thompson, assignor to Deere & Co., both of Moline, Ill.

2,338,327. **In Plasterboard Manufacturing, the Use of a Bi-Laterally Convex Rubber Pad.** O. P. Haegele, Columbus, O., assignor to United States Gypsum Co., Chicago, Ill.

2,338,424. **Limb Guard Consisting of Inner and Outer Laterally Curved Sheets of Elastic and Rigid Material Respectively; the Concave Surface of the Inner Sheet Is Lined with Sponge Rubber.** V. Giardini, Milan, Italy; vested in the Alien Property Custodian.

2,338,490. **In a Method of Decorating Fabrics, a Generally Flat Piece of Blowing Rubber Stock Secured to a Panel Board.** G. R. Cunnington, Grosse Pointe Park, assignor to National Automotive Fibres, Inc., Detroit, both in Mich.

2,338,535. **Shock Absorbing and Buoyant Vest Consisting Entirely of a Flat Sheet of Soft Cell-Tight Cellular Rubber Material.** H. Pfleumer, New Brunswick, N. J., assignor to Rubatex Products, Inc., New York, N. Y.

2,338,549. **Filter Bag Including a Pair of Filtering Panels Composed of Perforate Resilient and Extensible Rubber Sheet Material.** G. E. Shriver, Nutley, and J. U. Mann, Arlington, both in N. J., assignors to United States Rubber Co., New York, N. Y.

2,338,828. **Mat Consisting of Strips Having Alternate Layers of Diagonally Extending Heavy Cord Fabric Cut on the Bias and a Layer of Rubber Impregnating the Body of the Adjacent Layers of Fabric.** W. Weiner, Kew Gardens, N. Y.

2,338,875. **Vehicle Tire Having Substantially Rigid Channel with an Outer Section and Grooved Sidewalls Adapted to Be Placed around a Rim, Flexible Sidewalls Connectable to the Channel and Rim, and V-Shaped Beads That Can Be Wedged into Suitable Grooves on the Outer Diameter of the Flexible Sidewalls.** N. H. Shillman, Baltimore, Md.

2,338,937. **Pump Tubing and Bearing Assembly for Housing a Line Shaft, Including a Series of Tubing Sections Connected by Couplings and a Series of Rubber Spiders, Each of Which Provides a Rubber Bearing for the Shaft.** J. M. Hait, San Gabriel, assignor to Food Machinery Corp., San Jose, both in Calif.

2,338,999. **Spring Tire.** W. W. Chesnut, Yazoo City, Miss.

2,339,121. **In the Manufacture of Golf Club Grips, the Use of a Backing Strip of Vulcanized Rubber Commingled with Ground Cork.** F. Van Cleef, assignor to Van Cleef Bros., both of Chicago, Ill.

Dominion of Canada

416,655. **Inflatable, Rubber-Like Shoe to Be Mounted on Airplanes to Prevent the Accumulation of Ice.** W. C. Geer, Ithaca, N. Y., U. S. A.

416,755. **Rubber-Covered Roll.** B. F. Goodrich Co., New York, N. Y., assignee of V. L. Stoffer, Akron, O., both in the U. S. A.

416,758. **Knitted Fabric Having an Elastic Strand Incorporated in the Courses Adjacent to the Selvage Course.** Hemphill Co., Central Falls, assignee of R. H. Lawson, Pawtucket, both in R. I., U. S. A.

416,759. **Knitted Fabric in Which Elastic Yarn Is Incorporated so as to Produce a Rib-Like Effect.** Hemphill Co., Central Falls, assignee of W. L. Smith, Jr., Pawtucket, both in R. I., U. S. A.

416,770. **Rubber Joint.** Lord Mfg. Co., assignee of T. Lord, both of Erie, Pa., U. S. A.

417,213. **Rubber Tires Reenforced with Fabric Constructed of an Oriented Synthetic Linear Polyamide Monofil.** Canadian Industries, Ltd., Montreal, P. Q., assignee of G. P. Hoff, Wilmington, Del., U. S. A.

417,240. **Sock, with Elastic Thread Incorporated in the Top.** W. B. Davis & Son, Inc., assignee of R. E. Davis, both of Fort Payne, Ala., U. S. A.

417,248. **Upper Buffer Mechanism for a Railway Car Having a Molded, Flanged Flexible Rubber Pipe.** Dunlop Tire & Rubber Goods Co., Ltd., Toronto, assignee of D. R. Chadwick, Stauffville, both in Ont.

417,253. **Gasket Consisting of a Rubber Base Coated with Low Carbon Ferrochromium.** Electro Metallurgical Co. of Canada, Ltd., Toronto, Ont., assignee of R. Franks, Niagara Falls, N. Y., U. S. A.

417,263. **Tubular Plain-Knit Drop-Stitch Elastic Fabric.** Interwoven Stocking Co., New Brunswick, N. J., assignee of R. E. Davis, Jr., Fort Payne, Ala., both in the U. S. A.

417,320. **Sealing Means for Containers in Which a Rubber Ring Is Fitted into a Groove That Is Immersed into a Bitumen Solution.** H. Brand, Zollikon, Zurich, Switzerland.

417,430. **In Fabric Decoration, the Use of a Ply of Uncured, Thermally Expansive Rubber Stock.** National Automotive Fibres, Inc., assignee of G. Cunningham, both of Detroit, Mich., U. S. A.

417,477. **Combined Steel and Rubber Spring.** Transit Research Corp., assignee of E. H. Piron, both of New York, N. Y., U. S. A.

417,567. **Spinning Cot of Vulcanized Butadiene-Acrylic Nitrile Copolymer.** Dayton Rubber Mfg. Co., assignee of J. Rockoff, both of Dayton, O., U. S. A.

United Kingdom

557,220. **Buoyant Suits, Especially for Life-Saving Purposes.** Z. Siedlecki and Siebe, Gorman & Co., Ltd.

557,703 and 557,717. **Shaft Couplings Employing Metal and Rubber.** Metalastik, Ltd., M. Goldschmidt, and L. Heilbrunn.

557,799. **Outer Covers for Pneumatic Tires.** B. Levy.

557,878. **Vibration Isolating Means.** Wingfoot Corp.

557,929. **Electrically Conductive Fabrics.** United States Rubber Co.

PROCESS

United States

2,337,116. **Forming a Hollow Body of Rubber Having a Beaded Open End, by Dipping a Suitably Grooved Forming Body into a Bath of Liquid Rubber.** R. J. Limbert, Conshohocken, and E. E. Leach, Norristown, assignors to Lee Rubber & Tire Corp., Conshohocken, both in Pa.

2,337,169. **Cork Rubber Sheet.** G. H. Swart, Wabash, Ind., assignor to General Tire & Rubber Co., Akron, O.

2,337,550. **Producing Composite Products from Organic Plastic Material and Inorganic Material by Forcing an Organic Plastic Material in a Softened State into a Mold Cavity and Forcing an Inorganic Material into Another Portion of the Mold Cavity so That the Materials Will Unite under Pressure to Form a Composite Molded Product.** M. A. Crosby, Dayton, O., assignor to Hydraulic Development Corp., Inc., Wilmington, Del.

2,337,555. **Bonding Rubber Substance to Metal.** O. W. Hosking, Monroe, N. Y., assignor to Composite Rubber Products Corp., Bridgeport, Conn.

2,337,590. **Making Footwear by Applying on the Edges of Soles a Strip of Unvulcanized Rubber Which Covers the Edges of the Soles and Then Vulcanizing the Rubber.** S. Claveria, Vich, Spain.

2,338,827. **Producing Reenforced Rubber Articles by Depositing Latex on to the Exterior of a Form and Substantially around a Reenforcing Element Which Has Been Placed on the Form so as to Maintain a Space between Element and Form.** M. C. Teague, Ridgewood, N. J., and R. R. Sterrett, Naugatuck, Conn., assignors to United States Rubber Co., New York, N. Y.

2,338,978. **Rubber Thread with High Modulus of Elasticity.** T. L. Shepherd, Portslade, England, assignors to Clark Thread Co., Newark, N. J.

2,339,118. **Making Textile Fabric Shoe Linings by Coating Fabric with an Alkaline Emulsion Containing about 30 Parts Mixture of Dotria Wax with Equal Parts Candelilla Wax and Smoked Rubber Sheet, 5 Parts Stearic Acid, 3 Parts Ammonium Hydroxide, One Part Sodium-o-Phenylphenate, 2 Parts Alcohol, 140 Parts Water, and Drying the Coated Fabric.** A. P. Swett, Westwood, Mass., assignor to Beckwith Mfg. Co., Dover, N. H.

2,339,142. **Making Non-Skid Carpet Underlay by Calendering Blowable Sponge Rubber Compound to at Least One Side of a Woven Open Mesh Fabric.** V. H. Bodle and G. W. Blair, assignors to Mishawaka Rubber & Woolen Mfg. Co., both of Mishawaka, Ind.

2,339,145. **Embossing Sheet Materials of Rubber or the Like.** G. H. Callum, assignor to Mishawaka Rubber & Woolen Mfg. Co., both of Mishawaka, Ind.

Dominion of Canada

417,027. **Articles from Polymeric Vinylidene Chloride.** Dow Chemical Co., assignee of R. M. Wiley, both of Midland, Mich., U. S. A.

417,085. **Process in Which a Textile Material Is Impregnated with a Polyacrylic Derivative and a Synthetic Resin of the Formaldehyde Type, and Freed from Greasy Matter by Scouring with a Hot Alkaline Solution, Whereby Wear Resistance Is Greatly Improved and yet the Material Is not Sticky and Can Be Ironed.** Tootal Broadhurst Lee Co., Ltd., assignee of R. P. Foulds, both of Manchester, Lancaster, England.

417,247. **Method of Manufacturing Golf Balls in Which a Sac-Like Core Is Surrounded by a Tensioned Rubber Winding; Tension Is Maintained as a Result of Chemical Reaction between a Combination of Agents Contained in the Core.** Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., assignee of D. F. Twiss, Birmingham, Warwick, England.

417,392. **Forming a Full-Molded Puncture-Sealing Inner Tube.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of A. F. Iknayan, Indianapolis, Ind., U. S. A.

United Kingdom

557,268. **Applying Liquids to Lengths of Flexible Material and Apparatus therefor.** United States Rubber Co.

557,473. **Surgical Adhesive Dressings.** St. Dalmas & Co., Ltd., and A. De and S. W. Atherley.

557,574. **Seaming of Heat-Sealing Plies of Thermoplastic Film.** Wingfoot Corp.

CHEMICAL

United States

2,337,059. **Diolefins from Cyclic Aliphatic Acetals.** L. A. Mikeska, Westfield, and E. Arundale, Colonia, both in N. J., assignors to Standard Oil Development Co., a corporation of Del.

2,337,128. **Non-Dusting Litharge Consisting Essentially of Litharge and a Minor Proportion of a Petroleum Hydrocarbon Still Residue Resin.** H. L. Plummer, Philadelphia, Pa., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,337,172. **Halogenated Alkyl Carbonates Re-**

sulting from the Reaction of Chlorine with Organic Carbonates of the General Formulae RO-CO-OR and RO-CO-OR', in Which R and R' Represent Radicals of Four to 12 Carbon Atoms. B. H. Wojcik, assignor to Hooker Electrochemical Co., both of Niagara Falls, N. Y.

2,337,336. Condensation Product Derived from a Naturally Contained High Molecular Weight Viscous Material Precipitated from a Warm Propane Solution of a Residual Paraffin Base Oil Fraction. W. B. McCluer and R. W. Hufferd, assignors to Kendall Refining Co., all of Bradford, Pa.

2,337,337. Molding Composition Comprising a Filler and a Chemical Condensation Product Derived from a Naturally Contained High Molecular Weight Viscous Material Precipitated from a Warm Solution of a Paraffin-Base Oil Product in a Normally Gaseous Hydrocarbon Solvent Having Two to Four Carbon Atoms. W. B. McCluer, R. W. Hufferd, and F. J. Philippbar, assignors to Kendall Refining Co., all of Bradford, Pa.

2,337,338. Floor and Paving Composition Comprising a Filler Permanently Bonded by a Chemical Condensation Product Derived from a Naturally Contained High Molecular Weight Viscous Hydrocarbon Material Precipitated from a Warm Propane Solution of a Propane Dewaxed Cylinder Stock Derived from a Paraffin-Base Oil. W. B. McCluer, R. W. Hufferd and F. J. Philippbar, assignors to Kendall Refining Co., all of Bradford, Pa.

2,337,339. Blended Rubber Composition Comprising as Essential Ingredient, a Chemically Condensed Naturally Contained High Molecular Weight Viscous Material Precipitated from a Warm Solution of a Residual Paraffin-Base Oil Product in a Normally Gaseous Hydrocarbon Solvent Having from Two to Four Carbon Atoms per Molecule. W. B. McCluer and R. W. Hufferd, assignor to Kendall Refining Co., all of Bradford, Pa.

2,337,424. Thermally Stable and Corrosion-Inhibitive Coating for Metals in Which the Film-Forming Solids Comprise at Least 50% of a Chlorine-Containing Thermoplastic Resin in Which the Chlorine Atoms Are Attached to Carbon Atoms in Aliphatic Chains. F. R. Stoner, Jr., and G. W. Seagren, assignors to Stoner-Mudge, Inc., all of Pittsburgh, Pa.

2,337,464. Composite Rubber Articles in Which the Binding Agent Is a Product of the Interaction of Acetylene and a Mononuclear Monovalent Alkylated Phenol in Which the Molecular Ratio between the Phenol and the Acetylene Is Substantially 1:0.3-2.5. O. Hecht and H. Prillwitz, both of Ludwigshafen-on-the-Rhine, and I. Dane, Leverkusen-Schlebusch, both in Germany; vested in the Alien Property Custodian.

2,337,523. Plastic Thermosetting Composition Including a Heat Reactive Phenol-Form Aldehyde Resin and Massaranduba Wood Flour for at Least a Portion of the Filler. J. H. Lum, Dayton, O., assignor to Monsanto Chemical Co., Wilmington, Del.

2,337,562. Production of Stabilizing Agents from Sea Moss by Preparing a Concentrate of the Active Gelatinizing Principle of Sea Moss. A. A. Lund, Port Washington, N. Y., assignor to Jacques Wolf & Co., Passaic, N. J.

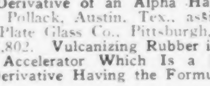
2,337,635. Vinyl Resin Composition Formed by the Condensation of Formaldehyde with Partially Hydrolized Polyvinyl Ester, and as a Solvent therefor a Nitroalkane Having not in Excess of Five Carbon Atoms. C. Bogin, assignor to Commercial Solvents Corp., both of Terre Haute, Ind.

2,337,650. Brake Fluid Containing n-Butyl Alcohol as a Major Component, Sufficient Glycerine to Minimize Any Rubber Attack of the Alcohol, and in Minor Proportion of 2-Methyl-2, 4-Pentanediol. F. E. Dolian, assignor to Commercial Solvents Corp., both of Terre Haute, Ind.

2,337,680. Vulcanizing a Rubber Containing at Least Half as Much Channel Black as Rubber in the Presence of a Member of the Class Consisting of 2-Mercapto-4, 5-Dimethyl Thiazole and Di-4, 5-Dimethylthiazyl Disulphide. W. E. Phillips, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,337,681. Copolymer of Styrene and a Saponifiable Derivative of an Alpha Haloacrylic Acid. M. A. Pollack, Austin, Tex., assignor to Pittsburgh Plate Glass Co., Pittsburgh, Pa.

2,337,802. Vulcanizing Rubber in the Presence of an Accelerator Which Is a Dithiocarbamic Acid Derivative Having the Formula



Wherein R Is a Radical Selected from the Group Consisting of Alkyl, Aralkyl, and Aryl Radicals, R' Is an Alkylene Radical Which Separates the Oxygen Atom from the Nitrogen Atom by at Least Two Carbon Atoms, and M Is an Organic Nitrogen Base. R. T. Dean, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,337,908. Gutta-Percha-Like Compositions Resistant to Oxidation, Comprising 5-25% by Weight of a Substantially Saturated Linear Poly-iso-Olefin Having a Molecular Weight in Excess of 1500, 5-20% of a Cyclized Derivative of Rubber, 30-60%, by Weight of a Wax, and as Homogenizing Agent, 10-50% of a Resin from the Group of the Polymers of the Terpenes Originating from Turpentine and the Hydrogenated Derivatives of These Polymers. G. P. Mack, Jackson Heights, assignor to Advance Solvents & Chemical Corp., New York, both in N. Y.

2,338,187. Heat-Stable Composition Containing Polymerized Vinyl Chloride Admixed with a Metal Salt of 2:4 Dihydroxyquinone; the Metal Is Selected from the Group Consisting of the Alkali Metals, Leads, and Zinc. J. R. Lewis and L. B. and W. M. Morgan, all of Blackley, Manchester, assignors to Imperial Chemical Industries, Ltd., London, both in England.

2,338,427. Reclaiming Rubber Vulcanizates Containing a Preponderating Amount of Butadiene Synthetic Rubber-Like Materials by Heating in the Presence of an Aromatic Mercaptan in an Atmosphere Containing Oxygen. W. Gumlich, Leverkusen-Schlebusch, and R. Ecker, Cologne-Rath, both in Germany; vested in the Alien Property Custodian.

2,338,429. Forming Insoluble Films from Urea Formaldehyde Resins. L. A. Gruenwald, New York, N. Y.

2,338,461. Producing Coatings, Which Includes Coating a Substratum with a Solution Containing about 8-12% Chlororubber, 8-16% Hard Resin, about 12% Drying Oil, and Less than 1% of a Rubber Vulcanization Accelerator, and Heating the Coating Obtained. G. Schultze, Manheim, Germany; vested in the Alien Property Custodian.

2,338,469. Synthetic Polymerized Condensation Product Containing 3-Chloropropyleneglycol-(2)-Phenylether-(1)- as Plasticizer; the Condensation Product Is the Reaction Product of Hexamethylene Diamine, Adipic Acid, and Caprolactam. K. Thinius, Eilenburg, Germany; vested in the Alien Property Custodian.

2,338,627. Symmetrically 1,3-Disubstituted 2-Ethylol Guanidine Wherein the Substituents Are Aryl Radicals. W. P. Ericks, Stamford and J. H. Williams, Riverside, both in Conn., assignors to American Cyanamid Co., New York, N. Y.

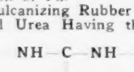
2,338,637. Resin-Like Product Formed by Condensation of Dicyandiamidine, Preformed Dicyandiamidine Sulphate and Formaldehyde; the Product Is Soluble in Neutral and Acid Aqueous Media. W. Gundel, Dessau, Germany, assignor by mesne assignments, to Hydronaphthene Corp., Wilmington, Del.

2,338,741. Process Including Polymerizing a Light Oil Ring Substituted Methyl Styrene Fraction, with a Light Oil Butadiene Fraction Which Has Been Previously Partially Polymerized. F. J. Soday, Upper Darby, Pa., assignor to United Gas Improvement Co., a corporation of Pa.

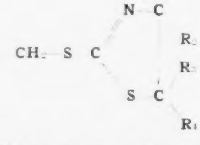
2,338,742. Process Including Polymerizing a Light Oil Ring Substituted Methyl Styrene Fraction with a Light Oil Isoprene Fraction Previously Partially Polymerized. F. J. Soday, Upper Darby, Pa., assignor to United Gas Improvement Co., a corporation of Pa.

2,338,743. Process Including Polymerizing a Light Oil Ring Substituted Methyl Styrene Fraction with a Light Oil Piperylene Fraction Previously Partially Polymerized. F. J. Soday, Upper Darby, Pa., assignor to United Gas Improvement Co., a corporation of Pa.

2,338,815. Vulcanizing Rubber in the Presence of a Substituted Urea Having the Structure

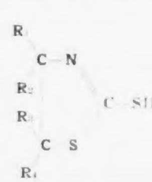


in Which Is Attached at Least One of the Nitrogen Atoms of a Group of the Structure



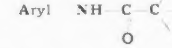
In Which R_1, R_2, R_3, and R_4 Are Members of the Class Consisting of Hydrogen, Hydrocarbon and Alkyl Ether Groups, and in the Presence of a Member of the Class Consisting of Monocarboxylic Acids and Their Metallic Salts. P. C. Jones, Silver Lake, and R. A. Mathes, both of Akron, O., assignors to B. F. Goodrich Co., New York, N. Y.

2,338,864. Vulcanizing Rubber in the Presence of the Reaction Product of a Compound Having the Structure

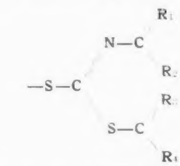


in Which R_1, R_2, R_3, and R_4 Are Members of the Class Consisting of Hydrogen Hydrocarbon and Alkoxy Groups, with Aqueous Ammonia and with Formaldehyde, and in the Presence of a Member of the Class Consisting of Monocarboxylic Acids and Their Metallic Salts. R. A. Mathes, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,338,863. Vulcanizing Rubber in the Presence of an N-Acylated Aryl Amine of the Structure



in Which Is Attached at Least One and Not More Than Two Groups of the Structure

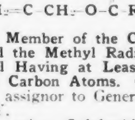


in Which R_1, R_2, R_3, and R_4 Are Members of the Class Consisting of Hydrogen, Hydrocarbon and Alkyl Ether Groups, and in the Presence of a Member of the Class Consisting of Monocarboxylic Acids and Their Metallic Salts. R. A. Mathes, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,338,948. Varnish Comprising Chlorinated Rubber Dissolved in a Solvent Consisting of about 92 Parts by Weight of Methylisopropylbenzene and about Eight Parts by Weight of Ethyl Lactate. P. Kummel, Oranienburg, Germany; vested in the Alien Property Custodian.

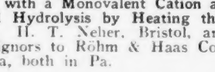
2,339,033. Plasticizing Rubber by Subjecting the Unvulcanized Rubber to the Action of a Thio Ester of a Paraffin Dicarboxylic Acid Belonging to the Oxalic Acid Series. R. L. Sibley, Nitro, W. Va., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,339,056. Polyvinyl Acetal Resin Composition Embodying a Mixture of Two Plasticizers, One of Which Is an Alkylamide Primary Plasticizer of the Group Consisting of Alkylamides Having the General Formula



In Which R Represents an Alkyl Group Containing from 5-17 Carbon Atoms, and X and Y Represent Alkyl Groups Having from 1-18 Carbon Atoms. J. K. Craver, Affton, assignor to Monsanto Chemical Co., St. Louis, both in Mo.

2,339,058. Coating Composition Comprising a Partially Polymerized Diallyl Ester of a Dicarboxylic Acid and an Allyl Ester Having the Structural Formula



Wherein R Is a Member of the Class Consisting of Hydrogen and the Methyl Radical, and R' Is an Alkyl Radical Having at Least One and not More Than Five Carbon Atoms. G. F. D'Alelio, Pittsfield, Mass., assignor to General Electric Co., New York, N. Y.

2,339,083. Preparing Sulphathiazole. L. C. Leitch and L. Brickman, both of Montreal, and L. E. Ryan, Dorval, assignors to Mallinckrodt Chemical Works, Ltd., Montreal, both in P. Q., Canada.

2,339,184. Stabilization of Aqueous Dispersions of Solid Polyvinyl Acetate by Adding an Alkaline Compound with a Monovalent Cation and Inducing Partial Hydrolysis by Heating the Alkaline Dispersion. H. T. Neher, Bristol, and W. R. Conn., assignors to Röhm & Haas Co., both of Philadelphia, both in Pa.

Dominion of Canada

416,694. Clear and Transparent Plastic Composition Including an Interpolymer of Methyl-Alpha-Chloroacrylate with Vinyl Acetate. Canadian Industries, Ltd., Montreal, P. Q., assignee of J. W. C. Crawford, Frodsham, and N. McLeish, Runcorn, both in Cheshire, England.

416,695. Completely Homogeneous Heat- and Light-Resistant Product Resulting from the Copolymerization of an Approximately Equimolar Mixture of Polymer-Free Monomaric Methyl Alpha-Chloroacrylate and Polymer-Free Monomeric Styrene. Canadian Industries, Ltd., Montreal, P. Q., assignee of H. W. Arnold, Marshallton, Del., U. S. A.

416,696. Interpolymer of Methyl Alpha-Chloroacrylate and Diethyl Fumarate; the Resulting Interpolymer Is Stable to Light and Heat. Canadian Industries, Ltd., Montreal, P. O., assignee of H. W. Arnold, Marshallton, Del., U. S. A.

416,697. Interpolymer Obtained by Polymerizing a Mixture of Polyamide-Forming Reactants

Including Hexamethylenediamine and at Least Two Additional Amide-Forming Reactants, One of Which Is Adipic Acid and the Other a Substance of the Class Consisting of 6-Amino-Caproic Acid and Its Amide-Forming Derivatives. Canadian Industries, Ltd., Montreal, P. Q., assignee of E. P. Czerwin, Wilmington, Del., U. S. A.

416,698. **An Interpolymer Produced by Polymerizing Bifunctional Reactants Including a Diamine Having at Least One Hydrogen Attached to Each Amino Nitrogen Atom, a Polymerizable Monoaminomonocarboxylic Acid and a Dibasic Carboxylic Acid.** Canadian Industries, Ltd., Montreal, P. Q., assignee of Wilmington Trust Co., Wilmington, Del., U. S. A.

416,699. **Process for Forming Linear Interpolyamides Having a Modulus of Stiffness Less Than 50 x 10 Lbs. Sq. In., by Heating at Polymerizing Temperatures a Mixture of Reactants Consisting of Stated Proportions of 6-Amino-Caproic Acid, Hexamethylenediammonium Adipate, Hexamethylenediammonium Suberate and Hexamethylenediammonium Azelate.** Canadian Industries, Ltd., Montreal, P. Q., assignee of M. M. Brubaker, Boothwyn, Pa., and W. E. Hanford and R. H. Wiley, both of Wilmington, Del., both in the U. S. A.

416,711. **Polymer of an N-Vinylimide of an Aromatic Dicarboxylic Acid Having Its Two Carboxyl Groups on Adjacent Ring Carbons.** Canadian Industries, Ltd., Montreal, P. Q., assignee of W. E. Hanford and H. B. Stevenson, both of Wilmington, Del., U. S. A.

417,053. **Treating a Lignocellulose Material to Produce a Product That Can Be Molded under Heat and Pressure in the Presence of a Plasticizer.** Marathon Paper Mills Co., Rothschild, assignee of J. G. Meiler, Wausau, both in Wis.

417,187. **Molding Powders Which Include a Phenol-Formaldehyde-Type Resin and from 2-25% by Weight of Polymerized Chloro-Butadiene Based on the Weight of Molding Powder.** Canadian Industries, Ltd., Montreal, P. Q., assignee of B. J. Wood, Billingham, Durham, England.

417,193. **Vulcanizing Rubber with 2-Mercaptothiazoline and Metal Salts Thereof, as Primary Accelerator, and an Accelerating Acyl Derivative of a Dithiocarbamic Acid, as a Secondary Accelerator, There Being from One Part to About 50 Parts of the Primary Accelerator to Each Part of the Secondary Accelerator.** Canadian Industries, Ltd., Montreal, P. Q., assignee of A. M. Neal, Wilmington, Del., and B. M. Sturgis, Pitman, N. J., both in the U. S. A.

417,199. **Vulcanizing Rubber with 2-Mercaptothiazoline and Metal Salts thereof, as a Primary Accelerator, and an Accelerating Derivative of a Dithiocarbamic Acid as Secondary Accelerator.** Canadian Industries, Ltd., Montreal, P. Q., assignee of A. M. Neal, Wilmington, Del., and B. M. Sturgis, Pitman, N. J., both in the U. S. A.

417,200. **Vulcanizing Rubber with 2-Mercaptothiazoline and Metal Salts thereof as a Primary Accelerator, and an Accelerating Metal Salt of a Dithiocarbamic Acid.** Canadian Industries, Ltd., Montreal, P. Q., assignee of A. M. Neal, Wilmington, Del., and B. M. Sturgis, Pitman, N. J., both in the U. S. A.

417,201. **Vulcanizing Rubber with 2-Mercaptothiazoline and Metal Salts thereof as a Primary Accelerator, and an Accelerating Ester of a Dithiocarmabic Acid as a Secondary Accelerator.** Canadian Industries, Ltd., Montreal, P. Q., assignee of A. M. Neal, Wilmington, Del., and B. M. Sturgis, Pitman, N. J., both in the U. S. A.

417,202. **Vulcanizing Rubber with 2-Mercaptothiazoline and Metal Salts thereof as a Primary Accelerator, and an Accelerating Substituted Ammonium Salt of a Dithiocarbamic Acid as a Secondary Accelerator.** Canadian Industries, Ltd., Montreal, P. Q., assignee of B. M. Sturgis, Pitman, N. J., U. S. A.

417,206. **Moistureproof Sheet Including a Transparent Film Composed Essentially of Paraffin Wax, Halogenated Paraffin Wax, a Binder (Chlorinated Rubber) and Plasticizer.** Canadian Industries, Ltd., Montreal, P. Q., assignee of J. A. Mitchell, Kenmore, N. Y., U. S. A.

417,207. **Moistureproof Sheet Wrapping Material Having a Base of Non-Fibrous Material Coated with a Composition Including Chlorinated Rubber, Wax, and Dimethyl Urea Ether Resin.** Canadian Industries, Ltd., Montreal, P. Q., assignee of D. D. Lanning, Williamsville, N. Y., U. S. A.

417,208. **Vulcanizing Rubber with a Small Proportion of an Accelerator of the Group of 2-Mercaptothiazoline, C-Alkyl-2-Mercaptothiazolines, C-Hydroxyalkyl 2-Mercaptothiazolines, and Metal Salts of Such 2-Mercaptothiazolines in Which All Valences of the Metals Are Satisfied by 2-Thiothiazoline Radicals, and a Small Proportion of at Least One Unsubstituted Aliphatic Monocarboxylic Acid.** Canadian Industries, Ltd., Montreal, P. Q., assignee of B. M. Sturgis, Pitman, N. J., U. S. A.

417,482. **Rubber Vulcanized in the Presence of an Accelerator Having the Formula $R.CH_2.S.C(:S)R_1$. Where R Is a Naphthol Group and $—S.C(:S)R_1$ Is a Dithio Acid Group.** Wingfoot Corp., Wilmington, Del., assignee of A. F. Hardman, Akron, O., both in the U. S. A.

United Kingdom

557,238. **Plastic Compositions.** Shell Development Co.

557,258. **Plastic Compositions.** Carbide & Carbon Chemicals Corp.

557,364. **Resinous Condensation Products.** Beck, Koller & Co. (England).

557,414. **Removing Acidic Constituents from Fluids.** Resinous Products & Chemicals Co.

557,436. **Propionitrile.** Wingfoot Corp.

557,512. **Polymerized Resin Acid Derivatives.** Hercules Powder Co.

557,557 and 557,558. **Resinous Compositions.** British Industrial Plastics, Ltd.

557,635. **Treatment of Rubber.** African Sisal & Produce Co., Ltd. C. L. Walsh, and J. May.

557,752. **Antioxidants.** United States Rubber Co.

557,803. **Reclaiming Waste Polychloroprenes.** United States Rubber Co.

557,807. **Resinous Molding Compositions.** American Cyanamid Co.

MACHINERY

United States

2,337,447. **Apparatus to Assemble Tire Strips into a Continuous Roll for Subsequent Feeding to a Tire Building Drum.** J. C. Carlin, Norristown, assignor to Lee Tire & Rubber Corp., Conshohocken, both in Pa.

2,337,857. **Apparatus for Shaping and Vulcanizing Tire Pulley Bands in Tire Shape.** L. E. Soderquist, assignor to McNeil Machine & Engineering Co., both of Akron, O.

2,338,280. **Vulcanizing Press.** J. W. Brundage, assignor by mesne assignments to McNeil Machine & Engineering Co., both of Akron, O.

2,338,499. **Machine to Make Cemented Pile Carpeting Including Means for Covering a Base Material with Cement or Adhesive Substance.** H. P. Faris, Philadelphia, Pa., and J. E. White, Trenton, N. J., assignors to National Automotive Fibres, Inc., Detroit, Mich.

Dominion of Canada

416,974. **Machine to Wind an Elastic Strand to Form a Ball.** B. Bogoslowsky, New York, N. Y., U. S. A.

417,141. **Machine for Covering Tennis Balls.** W. E. Humphrey, Jeannette, Pa., U. S. A.

417,391. **Apparatus for Treating Grooved Tires.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of O. B. Moore and G. G. Havens, both of Detroit, and G. F. Wikle, Grosse Pointe, both in Mich., U. S. A.

United Kingdom

557,302. **Machine to Form Fabric Bands for Pneumatic Tires.** W. J. Breth.

557,706. **Machines for Extruding Plastic Materials, Particularly over Electric Conductors.** Standard Telephones & Cables, Ltd., J. Delves, and P. N. Delves-Broughton.

557,727. **Apparatus and Method for Injection Molding.** Plax Corp.

557,742. **Apparatus and Method for Covering Elastic Filaments.** Filatex Corp.

UNCLASSIFIED

United States

2,338,620. **Repairing Air Bags.** C. O. Bryant, Batesville, Ark.

2,338,696. **Device for Loosening Tires from Wheel Rims.** C. A. West and F. A. Morgan, Selma, Calif.

Dominion of Canada

416,661. **Tire Pressure Gage.** C. A. Krantz, Chicago, Ill., U. S. A.

417,566. **Fiber Bearing Belt Connector.** Dayton Rubber Mfg. Co., assignee of A. L. Freedlander and N. J. Ritzert, all of Dayton, O., U. S. A.

United Kingdom

557,665. **Bead Locking Devices for Pneumatic Tires.** Dunlop Rubber Co., Ltd., W. E. Hardeman, and R. F. Daw.

557,954. **Means for Increasing the Grip of Tractive Effort of Pneumatic Tired Tractor Wheels.** G. R. Lyon.

TRADE MARKS

United States

404,755. Representation of a rectangle within another rectangle and containing the words: **"Brake Shoe."** Frictional elements for automotive products. American Brake Shoe Co., New York, N. Y.

404,884. **Penn-Craft.** Tire repair material. Pennsylvania Rubber Co., Jeannette, Pa.

404,888. **Neotex.** Waterproof piece goods. Harte & Co., Inc., New York, N. Y.

404,901. **Turgum.** Plasticizer and tackifier. J. M. Huber, Inc., New York, N. Y.

404,945. **Bronze Leaf.** Druggists' sundries. Armstrong Cork Co., Lancaster, Pa.

405,073. **Penn-Craft.** Tire recapping cement. Pennsylvania Rubber Co., Jeannette, Pa.

405,076. **Mal Tak.** Compounding agent for synthetic rubber. Ault & Wiborg Corp., New York, N. Y.

405,148. Representation of circle divided horizontally in half by parallel lines containing the word: **"Butyl."** Synthetic rubber. Standard Oil Co. of La., East Baton Rouge, La.

405,171. **Dov-A-Dur.** Footwear. French, Shriner & Urner Mfg. Co., Boston, Mass.

405,175. **Bunatak.** Plasticizer. Malrex Chemical Co., Malden, Mass.

405,188. **Oroplast.** Plasticizers. Oronite Chemical Co., Wilmington, Del.

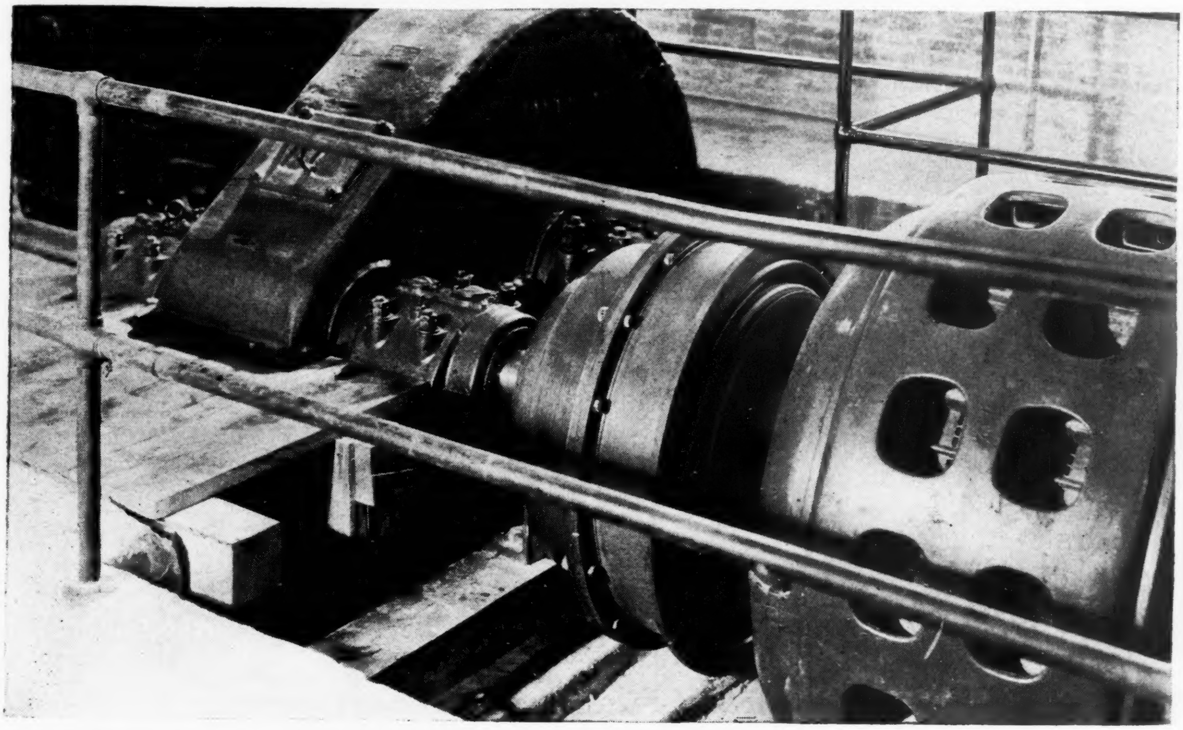
405,189. **Fellow-Worker.** Footwear. Dayton Gray Simpson, Nashville, Tenn.

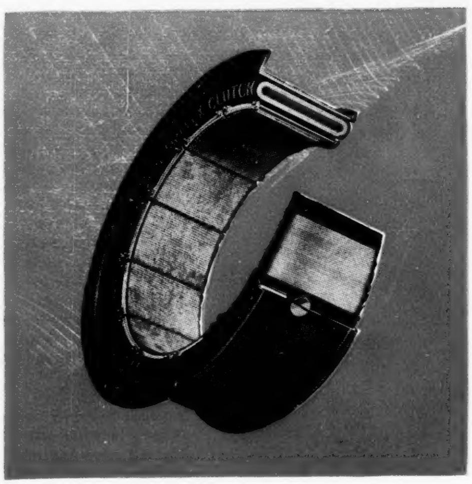
405,222. **Ivi-Flex.** Extruded tubing for electrical insulation. Irvington Varnish & Insulator Co., Irvington, N. J.

CALENDAR

Jan. 18—Feb. 15.	Fourth War Loan Bond Sale.
Feb. 1.	Los Angeles Rubber Group, Inc. Mayfair Hotel, Los Angeles, Calif.
Feb. 3.	Ontario Rubber Section. University of Toronto, Toronto, Ont., Canada.
Feb. 4.	Akron Rubber Group. Portage Hotel, Akron, O.
Feb. 4.	Chicago Rubber Group. Morrison Hotel, Chicago, Ill.
Feb. 11.	Rubber & Plastics Division, Montreal Section, S. C. I. McGill University, Montreal, P. Q. Canada.
Feb. 24.	Chicago Drug & Chemical Association. Luncheon-Meeting. Drake Hotel, Chicago, Ill.
Feb. 28—Mar. 3.	A. S. T. M. Spring Meeting and Committee Week. Netherland Plaza, Cincinnati, O.
Mar. 1-31.	Red Cross 1944 War Fund.
Mar. 10.	New York Section, A. C. S. Nichols Medal Award.
Mar. 10.	Rubber & Plastics Division, Montreal Section, S. C. I. McGill University, Montreal, P. Q., Canada.
Mar. 14-15.	National Association of Waste Material Dealers, Inc. Thirty-First Annual Convention and War Conference. Hotel Astor, New York, N. Y.
Mar. 24.	Rhode Island Rubber Club. Spring Meeting. Crown Hotel, Providence, R. I.
Apr. 1.	Rubber & Plastics Division, Montreal Section, S. C. I. Joint Meeting with Montreal Paint & Varnish Production Club. Queen's Hotel, Montreal, P. Q., Canada.
Apr. 26-28.	Division of Rubber Chemistry, A. C. S. Spring Meeting. Hotel Commodore, New York, N. Y.
June 26-30.	A. S. T. M. Annual Meeting. Waldorf-Astoria Hotel, New York, N. Y.

New Clutch for Rubber Mill Drives





The Fawick Airflex principle—Power Controlled by Air—eliminates all levers, arms and toggles, absorbs shocks and vibration, requires few adjustments and no lubrication. Maintenance costs are unusually low.

PROVED IN THE TOUGHEST SERVICE!

The Fawick Airflex Clutch has proved its ability "to take it" in the hardest clutch service of all—naval vessels where instant maneuverability and positive control of drive means the difference between safety and disaster.

With this unmatched performance record, this clutch is fast becoming standard equipment for all types of heavy-duty machinery drives—on paper mills, rubber mills, hoists, cranes and drags, road machinery, oilfield drilling rigs, heavy presses and shears.

Where the going is toughest—where positive, trouble-free clutch service is a "must"—the Fawick Airflex Clutch is daily making new records for reliability and economy.

You are invited to consult our engineering department on all clutch problems.

FAWICK AIRFLEX COMPANY, INC.
9919 Clinton Rd. Cleveland 11, Ohio
In Britain, Crofts Engineers, Ltd., Bradford, England

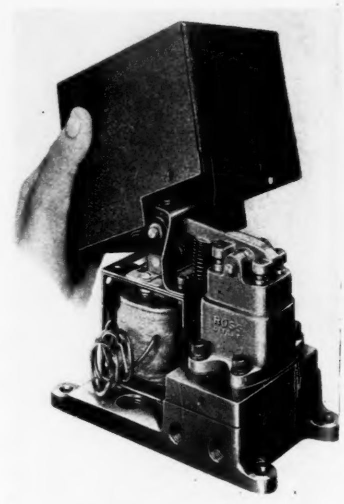
FAWICK *Airflex* CLUTCH

POWER CONTROLLED BY AIR

New Machines and Appliances

New Midget Air Control Valve

AN UNUSUALLY compact solenoid air control valve which can be operated at sustained speeds up to as high as 400 reversals a minute is a recent development. This newly designed valve, known as Ross model No. 835, is a ¼-inch heavy-duty, solenoid operated, four-way valve for the control of double-acting cylinders: it may also be used as a three-way valve by plugging one outlet. Overall dimensions of model No. 835 are length seven inches, width 3½ inches, height 5¼ inches. Other noteworthy features are its low current consumption, noiseless operation, and long life. This valve is the same poppet-type principle that Ross Operating Valve Co. has been building for the past 20 years.



New Air Control Valve

New X-Ray Unit for Industry

SEARCHRAY MODEL 150, second in a series of safe, self-contained, easily operated X-ray units for industry, was recently announced. This instrument is designed for inspection of parts, assemblies, and finished products of metal, hard rubber, plastics, ceramics, dielectric materials, etc. Plant personnel can quickly take the highest quality sharp radiographs, without the expense of a skilled X-ray technician or the cost of a lead-lined room. It is simple to operate because of fixed milliamperage over the entire kilovolt range. An electrical interlock, which interrupts the circuit, while the radiographic compartment is open, eliminates any danger to the operator from X-radiation.

Searchray Model 150 X-Ray Unit

Searchray has a continuous kilovolt regulator which permits adjustment during viewing operation at any point from 0 to 150 kilovolts, so that, depending on the density and thickness of the part under observation, greater clarity on the fluoroscopic screen can be obtained. The apparatus can also be set for correct metal thickness on a direct reading scale when radiographs are to be taken. A cassette tunnel at the bottom of the radiographic compartment makes possible insertion and removal of X-ray film without disturbing the position of the object. Under this tunnel a fluoroscopic screen is mounted. The image of the object can be viewed in a

(Continued on page 510)

EUROPE

RUSSIA

Effect of Resins on Solution of *Kok-* and *Tau-Saghyz*

Among the investigations on home-grown rubber carried out by Russian chemists have been experiments to determine the effect of the resins contained in *kok-saghyz* rubber on the viscosity of solutions of this and of *tau-saghyz* rubber. In a series of tests, solutions were prepared from the following types of rubber:

Sample No.	Method of Preparation	Kind of Rubber
1	Technical rubber obtained by usual factory process: (1) boiling roots in 2% alkali solution; (2) separation by centrifugation; (3) washing and creping; (4) drying	*Kok-saghyz*
2		
3		
4	Benzol extraction from roots	
5	Pure hydrocarbon rubber	
6	Pure hydrocarbon rubber	*Tau-saghyz*

Samples 1, 2, and 3 were ground and extracted with acetone in nitrogen atmosphere for 24 hours. The resin obtained was separated from the acetone, dried in a vacuum, and later added in definite quantities to the benzol solutions of the various rubbers. For the solution the purified rubber was dissolved in benzol (benzol saturated with nitrogen) in cold for 2-3 days.

For Sample 4, the *kok-saghyz* roots were first ground, then sifted to remove the greater part of non-rubber materials; the remainder was treated with hot water to remove water-soluble substances, dried at 25°C., and, while still containing a certain amount of cellulose and other substances, was treated with benzol saturated with nitrogen. The extract was cleared of insolubles and coagulated with acetone, and this coagulum in turn subjected to complete extraction with acetone. The solution was then prepared as for the preceding samples.

For Samples 5 and 6, the initial steps of preparation were the same as for Sample 4. After aqueous extraction, the material was subjected to acid and then alkaline treatment. The resultant product was carefully washed and dried, extracted in cold with benzol, and then treated at ordinary temperature, in darkness, with 8% alkali. The alkali and surface-active substances were precipitated, and the solution was treated with 0.2% sulphuric acid to neutralize the alkali. Next the solution was separated by precipitation and washed with 1% sodium bicarbonate and then washed several more times with water, and precipitated again with alcohol and acetone. To avoid oxidation all operations were conducted in the dark in the presence of hydroquinone and nitrogen in the rubber solution. After drying in a vacuum, the resultant rubber hydrocarbon was transparent and of an amber-yellow color.

The resin obtained from the technical *kok-saghyz* rubber was completely soluble in benzol, toluol, xylol, chloroform, carbon disulphide, carbon tetrachloride, acetic ethyl ether, and isoamyl alcohol. It is dissolved incompletely in sulphur, in sulphur ether, and alcohol, both at ordinary and elevated temperatures; solution in acetone was incomplete at ordinary temperatures, but was complete when heated.

Only the resin of *kok-saghyz* rubber was studied and added to solutions of both *kok-saghyz* and *tau-saghyz* rubbers, in amounts representing 5%, 10%, 15%, and 20% of the weight of rubber in the solution.

The effect of the resin on the solutions was judged on the basis of the viscosity under various conditions of concentration, pressure (for the first three samples), and temperature (for the pure hydrocarbon samples). In addition the viscosity of some of the samples was tested by the Behre method.

The Staudinger formula $\eta_{sp} = C_{mol}K_mM$.
was used as basis for calculating the molecular weight of rubber of sol-solutions with and without resins.

The results of the tests indicated:

The effect of resins on the viscosity of rubber solutions is only noticeable in gel-solutions and not in sol-solutions, and the effect is proportional to the amount of resin added and to the concentration of the solution—the greater the amount of resin added and the greater the initial viscosity of the solution, the greater the decrease in viscosity resulting from the presence of the resin.

The action of resins is more marked in gel-solutions of *tau-saghyz* than of *kok-saghyz* rubbers.

In the temperature tests (carried out at 20, 40 and 60° C.) increase in temperature caused a decrease in viscosity, especially marked in concentrated solutions and noticeable even in dilute

solutions. The changes are held to be due not only to physical, but also to chemical factors, for besides a decrease in the coefficient of internal friction, there was a change in the structure of the rubber, especially in the presence of light.

As the resins seem to have no effect on the sol-solutions, Staudinger's formula for determining the molecular weight of rubber from the specific viscosity may be used for sol-solutions of *tau-* and *kok-saghyz* rubbers provided calculations proceed from the concentration C_{mol} of only pure rubber in solution.

The addition of resins causes a slight decrease in the deviation of rubber solutions from the Hagen-Poiseuille law—that is, there is some disruption of the rubber structure (the index for structural viscosity drops slightly). When resin is added to rubber solutions, the index obtained by Behre's method varies, but the change is not regular.

Guayule in Russia

American guayule seems to thrive very well under the climatic conditions of certain parts of Soviet Russia. In 1939 it was reported that some plantations had already been established; in addition nurseries had been set up on state farms in the Margoshewan district, from which it was expected to be able to obtain enough high-grade seed to plant 400 hectares. However, at the time a suitable method of extraction to obtain high-quality rubber had not yet been developed.

GREAT BRITAIN

Crude *vs.* Synthetic Rubber after the War

As a contribution toward promoting understanding between Britain and America, more particularly on the position of rubber after the war, *India Rubber Journal* in a recent issue presented the British view of the matter as expressed by some of the leaders of the British rubber plantation industry. Below are some of the more important points made.

Sir John Hay, addressing stockholders of United Sua Betong Rubber Estates, Ltd., May 4, 1943:

"In the international trade of this country and in the sphere affecting the social and economic welfare of our Colonial subjects, there is no single enterprise of greater importance than the plantation rubber industry. . . .

"Approximately half of the rubber areas in the East are held by Asiatic small-holders who are dependent on them for their livelihood. . . .

"Any serious curtailment of the rubber industry's activities would add to the impoverishment and hardship of a country long occupied by an enemy Power and would make almost insoluble the social and economic problems of the postwar era.

"The interval remaining for the formulation and settlement of detailed plans for the resumption of productive operations in the East may alas! be all too long, but in the present at least we should exert ourselves to see that the case for the plantation rubber industry is fairly stated and that no misunderstandings or misapprehensions are allowed to rob us of the postwar freedom to compete on fair terms in all the markets of the world."

Harold F. Copeman, chairman, Rubber Growers' Association, referring to synthetic rubber in his annual speech on May 5, 1943:

"The Atlantic Charter does refer to collaboration in the economic field to secure improved labor standards, economic advancement and social security, but it also refers to equal access by all nations to raw materials. If the spirit of the Charter is to prevail, then it seems that some of the new synthetic products may have to rank as raw materials. . . .

"My own view is that we shall find, when the time comes for us to resume our normal activities . . . that the future of a natural rubber and of the synthetic product is bound up one with the other, that they are complementary to each other."

P. J. Burgess, at the annual meeting of Kinta Kellas Rubber Estates, Ltd.:

"The future of the industry must depend upon the demand and price for plantation rubber following on the war conditions which have forced into being alternative sources of supply of various form of synthetic material which can substitute much, but not the whole of natural rubber. All costs of production are in a state of flux now and postwar costs cannot be expected to correspond to prewar figures. It is certain that there will have to be some form of control for a considerable time after resumption of work over individual operations, and it is to be hoped that this control will

have for one of its main objects the avoidance of an industrial war between natural rubber and synthetic substitute which could only end with the impoverishment of both and the ultimate benefit of neither of the producers, nor of the great consuming public."

H. Eric Miller, at the annual meeting of Harrisons & Crosfield, November 9, 1943:

"Two alternatives lie ahead of us. Either we have to fight for our existence in open competition with the newly established synthetic industry, or the two industries together with the manufacturers will work out some mutual accommodations to enable the world to have the benefit of the best that our different raw materials are capable of giving. . . .

"Amongst the rubber manufacturers of the world the plantation industry has many friends, and I think we are entitled to assume as between the allied countries who are fighting together shoulder to shoulder against a common enemy, the postwar era should be governed by ready friendly cooperation for the common good rather than by nationalistic rivalries. Otherwise our present cooperation would indeed be a hollow sham, and there would be no hope for that better world which right-thinking people everywhere desire to help to bring about. My faith is in the triumph of the right spirit."

Sir Frank Swettenham, to stockholders of Lumut Rubber Estates, Ltd., December 6, 1943:

"Rubber has become a necessity, especially for Powers engaged in war, and you have no doubt read in the Press that the United States of America . . . are now engaged in constructing great factories for the manufacture of synthetic rubber, and though it is impossible to say at present how that will affect the growers of natural rubber, the synthetic product of these American factories will constitute a formidable competitor of natural rubber. You will no doubt bear this in mind, for it will be a consideration of great importance when peace is restored."

Sir George Maxwell, at the annual general meeting of Sengat Rubber Estates, Ltd., December 6, 1943:

"Synthetic rubber has come to stay, and improvements in the various types now in production are certain. . . .

"In the interests of the rubber industry, the two producing parties should cooperate in giving the best possible service to the consumer. In synthetic rubber, the systematic research all over the world is intense. On the side of plantation rubber, there is still room for more research into the properties of latex and manufacturing methods. There is still much to be done in finding new uses for rubber; and in view of housing shortage and rebuilding problems all over the world, the properties of sheets of rubber, as non-conductors of heat, deserve further investigation."

H. J. Welch, at the annual meeting of Malayalam Plantations, Ltd., December 9, 1943:

"On our present knowledge of the cost and uses of synthetics and of the increasing demands for rubber, I think that there are good grounds for the view that, in addition to the synthetics which may be absorbed, the world will continue to need plantation rubber in very large quantities and to obtain it, in the long run it must be prepared to pay remunerative prices to the producers."

Sir Eric Macfadyen, in an article in the December issue of *The Crown Colonist:*

"Rubber is *important* to the economics of French Indo-China and to those of Ceylon and India; to British Malaya and the Dutch eastern empire it is *vital*. It is a mainstay of the public revenues of these territories. Millions of their inhabitants depend directly or indirectly on these for their livelihood. Rubber is the one cash crop of populous regions; it has become the main balancing factor in the trade between the agricultural East and the industrial West. . . . In terms of human values, the collapse of the plantation industry would be a world disaster of the first magnitude, jeopardizing many of the prospects of expanding trade and of the creation of improved markets in relatively undeveloped countries on which the hopes of increased world prosperity are founded. . . .

"After the war there will be cogent strategic arguments for the Great Powers, and in particular, the U. S. A., the U. S. S. R., and Germany, to maintain their potential independence of external sources of what experience has shown to be an essential munition.

"Economically, however, it will be no more impossible to work out a *modus vivendi* for the new products, alongside the old, than was the adjustment, for instance, of the development of rayon with the continued utilization of natural textiles. In the meantime, we may forsee a period of uncertain length in which, not for the first time, there will be redundant capacity. To the extent that extra-economic considerations properly come into the picture, it will be the function of international statesmanship to carry over the interval of growing pains by a regime of international regulation which will preserve intact the sources of supply; all of which will before long be wanted. The machinery of collaboration built up between the United Nations will lend itself to this task, which falls within the sphere of the world order forecast in the Atlantic Charter. That the evolution of new products capable of promoting the wealth of nations should be crabbed is unthinkable; it is equally unthinkable that the proved capacity of the plantation industry should be sabo-

A chart to help you choose the best plasticizer for your needs

The supply of plasticizers is insufficient to meet wartime demand. For that reason, we suggest that you review the characteristics of Monsanto Plasticizers in the light of your own needs . . . to make sure you are using those that serve you most efficiently now . . . to help you select the *right* plasticizer for your postwar, long-range planning.

A review of the chart printed below will serve as a preliminary check. At your request, we will send additional information on any specific problem you may have on plasticizers. Write or wire: MONSANTO CHEMICAL COMPANY, Rubber Service Department, Second National Building, Akron, Ohio.

CHARACTERISTICS OF MONSANTO PLASTICIZERS

	Mol. Wt.	Color and Form	Boiling Point	Cryst. or Melt. Point	Sp.G.	Lbs. per Gal.	Refrac. Index	Evap. Rate Oms/sq. cm/hr/100°C	Solubility in Water	Retentivity in N/C	Retentivity in Ac/C	Light Fastness in N/C	Light Fastness in Ac/C
Tricresyl Phosphate	368	Colorless liquid	295°C/13 mm	Non-cryst., solid at −35°C	1.165/20°C	9.7	1.556/20°C	0.00000708	Less than 0.002% at 85°C	100 plus	0	Poor	—
Triphenyl Phosphate	326	White flakes	245°C/11 mm	48.5°C	1.268/60°C	10.5	——	0.00000028	0.001% at 34°C 0.002% at 54°C	100	80	Poor	Fair
Santicizer 8	199	Light amber liquid	——	——	1.188/25°C	9.9	——	0.0002659	0.13% at 23°C 0.213% at 48°C	100	90	Poor	Good
Santicizer 9	171	White granules	——	105°C	1.313/25°C	10.9	——	0.000053 at 65°C	1% at 34°C	25-30	25-30	Poor	—
Santicizer B-16	336	Colorless liquid	219°C/5 mm	Below −35°C	1.097/25°C	9.15	1.490/25°C	0.0000881	0.0012% at 30°C	100	20-30	Excellent	Excellent
Santicizer E-15	280	Colorless liquid	190°C/5 mm	20°C	1.180/25°C	9.84	1.498/25°C	0.0001106	0.0175% at 30°C	100	100	Excellent	Excellent
Santicizer M-17	266	Colorless liquid	189°C/5 mm	Below −35°C	1.220/25°C	10.2	1.504/25°C	0.000221	0.09% at 30°C	100	100	Excellent	Excellent
Dibutyl Phthalate	278	Colorless liquid	206°C/20 mm	−35°C	1.047/20°C	8.75	1.490/25°C	0.000221	0.001% at 30°C	100	Less than 20	Excellent	—
Diethyl Phthalate	222	Colorless liquid	295°C	−0.3°C	1.123/20°C	9.35	1.503/20°C	0.000617	0.058% at 30°C	100	100	Excellent	Excellent
Dimethyl Phthalate	194	Colorless liquid	282°C	0°C	1.196/15.6°C	10.0	1.515/20°C	0.001925	0.4% at 32°C 0.6% at 63°C	100	100	Excellent	Excellent
Diphenyl Phthalate	318	White powder	——	69°C	1.28/25°C	10.68	1.572/74°C	——	Insol.	—	20	Poor	—

Tricresyl Phosphate and Triphenyl Phosphate have excellent Fire Retardation.

MONSANTO CHEMICALS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

ARMY (E) NAVY

SERVING INDUSTRY . . . WHICH SERVES MANKIND

taged. To shirk the reconciliation of the two and permit unregulated competition to supervene, and the prosperity of wide territories to be subverted by hectic market fluctuations, would be one sure way to prepare the ground for the seeds of future world convulsions."

Synthetic Rubber Tires

Through some misapprehension it had been understood in certain quarters that starting from December, 1943, all tires would contain a certain amount of synthetic rubber, or even be made entirely of synthetic rubber. According to a correction by Rubber Control such is not the case. Some automobile and cycle tire covers have for some time been made of synthetic rubber, and it was expected that before the end of 1943 all such tires would be so made. But the situation as regards heavy-duty tires for trucks and buses is different, and more difficult. Here the change will have to be made step by step, in fact almost size by size, since plant and methods have to be adapted to suit the new material, and all this must be done without loss of output.

Meantime the Tire Manufacturers' Conference has announced that cycle-tire inner tubes made of GR-S have been issued, and marked with a letter S.

New Companies Making Synthetic Rubber and Resins

On November 3, 1943, the Minister of Production, Oliver Lyttleton, for the first time granted a license to a British company to produce synthetic rubber in bulk. This company, the British Celanese Ltd., apparently is not going to confine itself to the production of any special type of synthetic rubber and will also produce other synthetic products. It is said to be planning on producing all important raw materials itself, will finance the undertaking itself, and take full responsibility of the technical side of the work. Meanwhile a special plant is being erected to extract oil from coal for production purposes; it is estimated that 4½ tons of coal will yield enough oil to produce one ton of synthetic rubber. No definite data have been issued as to the production capacity aimed at, though the director of the company appears to have stated that the complete installation of plant with an annual output of 36,000 tons of synthetic rubber would cost £4,000,000.

The growing list of new companies being formed to manufacture synthetic resins and the like plainly reflects the great interest that British businessmen and investors are showing in the plastics industries. Below are a few of the new concerns recently registered:

Holoplast, Ltd., formed with a capital of £140,000 to acquire the business or shares of Aerolectric Mouldings, Ltd., and to manufacture and deal in synthetic-resins-bonded laminated products including fabric materials as described in British patents Nos. 537,668, 537,773, 542,914, and 546,089.

Galin, Ltd., capitalized at £10,000 to manufacture, distribute and sell Galin and other rubber substitutes and articles composed thereof or treated therewith.

Wilson Novatex, Ltd., capital £10,000, to manufacture and deal in plastic powders, chemicals, bakelite, latex, rubber, etc.

Consolidated Plastics, Ltd., capital £1,000, to manufacture and deal in all kinds of plastics, to mold and turn erinoid, bakelite, ebonite, plastic materials, etc.

Plastic Publicity, Ltd., capital £1,000, to manufacture and deal in a wide variety of plastics, plastic materials, rubber, etc.

Andover Plastics, Ltd., capital £5,000, to acquire the business of plastic molders, manufacturers, and dealers in plastic materials carried on by William Bell & Sons, Ltd., Andover, Hants.

Tuffanlite Products, Ltd., capital £1,000, to manufacture and deal in plastics, molding materials, rubber, gutta percha, etc., and goods made thereof.

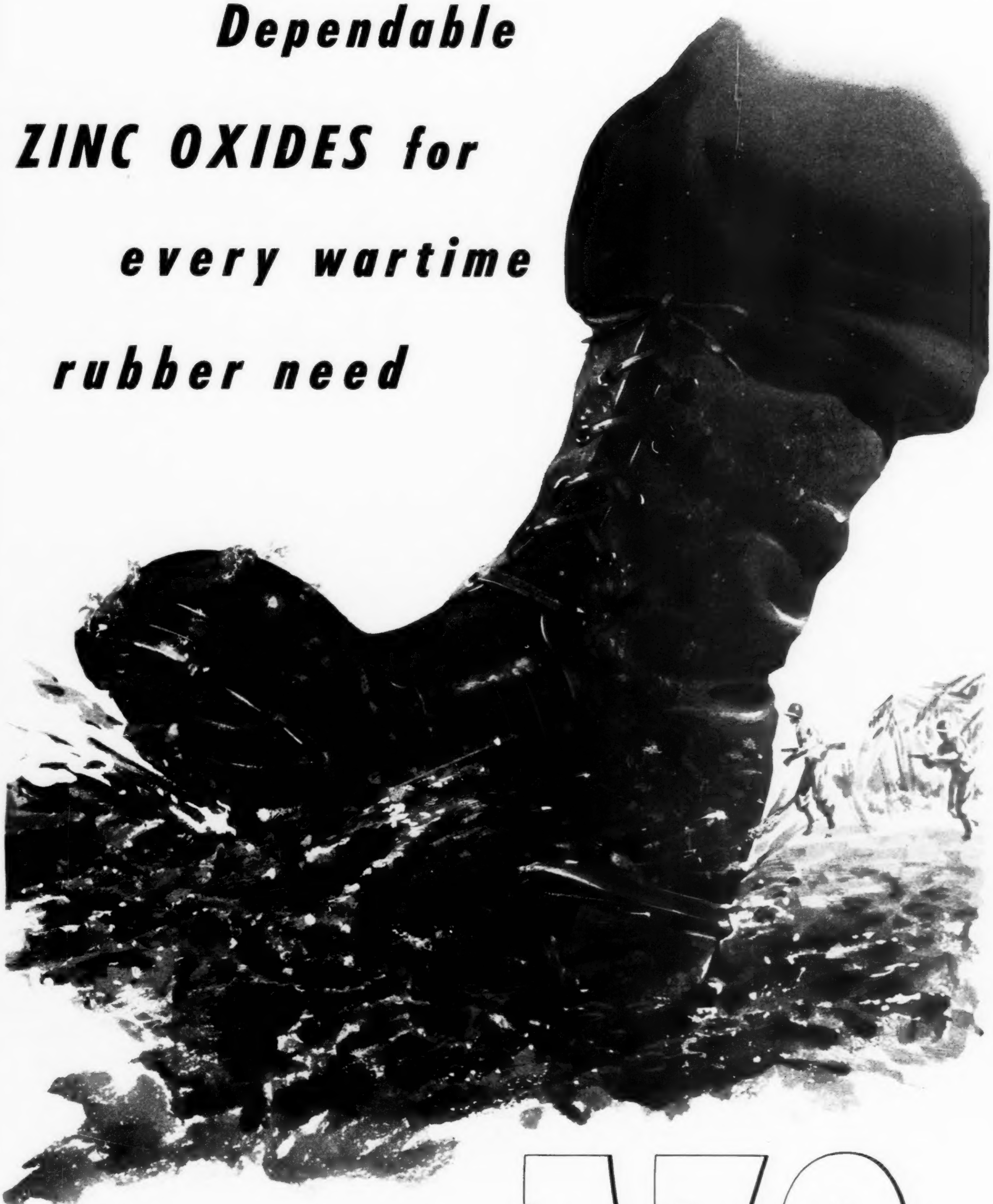
New X-Ray Unit

(Continued from page 502)

mirror through a folding eyepiece, and the operator looks into this while seated in front of the instrument. This facilitates the positioning of an article before taking a radiograph.

Long tube life on continuous or intermittent operation is assured by an electrical circuit so arranged that high tension can only be applied at a relatively low value. An automatic, electrically operated water valve controls the cooling of the tube. The overall height of this model is 82 inches; the radiographic compartment is 25¾ inches high, 35 inches long, and 25 inches deep. Current characteristics are 220 volts, single phase, 60 cycles, AC. Weight is approximately 600 pounds, mounted on sturdy rocker legs for moving about the plant. North American Philips Co., Industrial Electronics Division, 100 E. 42nd St., New York, N. Y.

Dependable ZINC OXIDES for every wartime rubber need



AZO ZINC OXIDES

AMERICAN ZINC SALES CO., Distributors for AMERICAN ZINC, LEAD & SMELTING CO.

COLUMBUS, OHIO - CHICAGO - ST. LOUIS - NEW YORK

Editor's Book Table

BOOK REVIEWS

"Handbook of Plastics." Herbert R. Simonds and Carleton Ellis. Published by D. Van Nostrand Co., Inc., 250 Fourth Ave., New York, N. Y. 1943. Cloth, 1082 pages, 6½ by 9¼ inches. Subject and author indices. Price $10.

This book was designed as a comprehensive reference work that would treat the details of the subject of plastics in one volume. Started in 1940, the original outline of the text was prepared, and several sections on plasticizers, pigments, and solvents were prepared and filed in the library of the Ellis Laboratories where they were found of immediate value. It was then decided to invite representative technical men in the industry to form an advisory committee to guide the authors in the determination of the contents of the book, and it is stated that these contents are to a very real degree the result of the cooperation and advice of key men in the industry. With the death of Carelton Ellis in 1941, M. H. Bigelow became associated with Mr. Simonds in the completion of the Handbook.

The book is divided into nine major sections intended to cover fully the present state of the industry, the physical and chemical properties of plastics, their production, manufacture and finishing, and all of the useful information which anyone working with plastics or desiring full and complete information on plastics should find in a well organized and thorough treatment of the subject. Part I, the introduction, gives a survey of the industry including history and progress, followed by essential facts concerning the major manufacturing companies. Part II, "The Physical Properties of Plastics," is divided into three chapters, one devoted to tables of properties of plastics, one to test methods for physical properties, and one on plastics catalogs, which contains a group of condensed commercial catalogs of the leading manufacturers of molding powders and synthetic resins. Part III, on "Materials," has seven chapters. The first is on ingredients of the plastics mix and describes fillers and includes tables on plasticizers and solvents. A chapter on plastics materials is next, followed by synthetic textile fibers and then synthetic rubber and elastomers. Mention is made of various rubber and synthetic rubber and resins mixtures for special purposes in this latter chapter. The next chapter is on natural resins, then come chapters on films, plywood, and synthetic coatings.

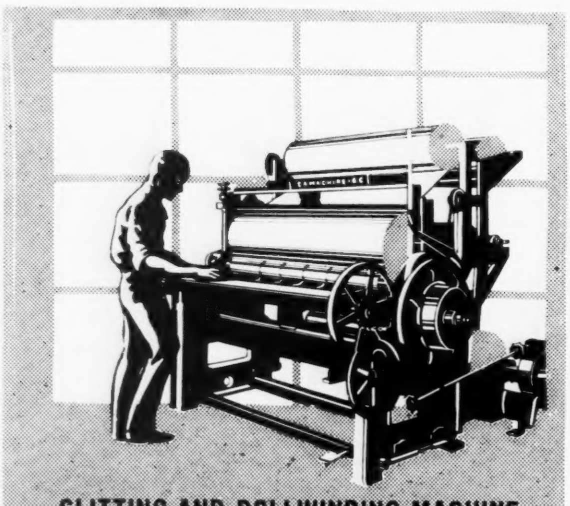
Part IV, "Manufacture of Plastics," has two chapters: one on manufacturing processes and the other on plastics plant equipment. Part V, which deals with "Processing and Fabrication," is divided under methods of processing and fabrication, methods of finishing plastics, equipment for molding plastics, and molds. "Chemistry of Plastics" in Part VI has chapters on chemistry and analysis of plastics. Part VII, "Applications of Plastics," discusses plastics in industry, with the latest information on current fields of usefulness and also designing molded plastics parts. Under "Commercial Considerations" in Part VIII, plant practice, selection of materials, estimating and paper work in the plastics industry, and workers' welfare are described. Part IX, "Appendix—Glossary—Bibliography", contains many useful tables and the name and subject indices.

The above listing of the contents of this book will indicate that the authors have been successful in their expressed purpose of providing all the essential facts and figures of the entire plastics industry in one volume. The book is well illustrated and should be of great assistance to the many new workers in the plastics industry.

"A.S.T.M. Standards on Textile Materials" (with Related Information). American Society for Testing Materials, 260 S. Broad St., Philadelphia 2, Pa. October, 1943. Paper, 9¼ by 6 inches, 458 pages. Price $2.25.

Methods of testing, specifications of textiles and related materials, and definitions and terms developed by Committee D-13 of the Society and considerable other data and related information useful to those who deal with textile materials are included in this recent publication. In the cotton section are specifications and methods for holland cloth, tire fabrics, other than cord fabrics, hose and belting fabrics, goods for rubber and pyroxylin coating; specifications for 0.007-inch cotton tape for electrical purposes; methods and tolerances for tire cord, woven and on cones, and carded gray goods; and specifications for tolerances of numbered duck.

Methods for tolerances for rayon tire cord, woven and on cones, are among 11 requirements for silk and rayon. Six standards pertain to asbestos tape. Several general standards on such subjects as air permeability, fire-retardant properties, color fastness to light,



finishes, and resistance to insect pests, microorganisms, and water are included in the first section of the book. There are also an extensive glossary of textile terms, a list of man-made and natural fibers, a table of terms relating to hand of fabrics, and a series of definitions and photographs of defects in woven fabrics.

"The Story of Scrap Rubber." Howard Wolf. Published by A. Schulman, Inc., Akron, O. 1943. Cloth, 9¼ by 6 inches, 112 pages. Illustrated.

The co-author of that absorbing volume, "Rubber: A Story of Glory and Greed", has written a concise history of the scrap and reclaim industries pictorially enhanced with more than a score of large photographs which show all the important operations of salvaging used rubber.

Rubber business, Mr. Wolf points out, began as a scrap industry in the late Eighteenth Century when Portuguese sea captains, the first rubber dealers, offered articles made by South American Indians which could be used to remanufacture various rubber articles desired in this country and in Europe. An account is given of the various reclaim invention developments, which preceded the perfection of the alkali digestion reclaim process in 1899 by Arthur Hudson Marks. He it was who made the scrap rubber industry possible. Its rapid growth in the Twentieth Century is one of the most interesting sagas of American enterprise, which has the impact of a dramatic climax in the war years when scrap saved the rubber situation of the United Nations in the interval of waiting for the required synthetic production.

The final chapter stresses the achievements and unsolved problems in reclaiming synthetic scrap rubber. The specifications for scrap rubber of the Rubber Reclaimers Association, Inc., as revised November 7, 1941, are given in an appendix. The volume is sponsored by A. Schulman, Inc., scrap rubber suppliers for the reclaim industry.

NEW PUBLICATIONS

"Neville Coal-Tar Solvents." The Neville Co., Neville Island, Pittsburgh, Pa. 40 pages. Data on grades, specifications, and uses of standard coke oven light oil distillates and special coal-tar solvents are given in this booklet. Testing methods are described, and a section of the booklet is devoted to coal-tar solvents as a class, and solubility tables for many resins, gums, rubbers, and waxes are presented. Another section is used for refined solvents, and many applications of the various types are listed. Semi-refined solvents are next listed and discussed, and information on high boiling solvents, heavy solvents, and tar acid oils is then listed and explained. Graphs of relative distillation ranges are also given; while specific gravity and temperature conversion tables complete the booklet.

"Properties and Uses of Zinc Borate-3167 Fire Retardant." The New Jersey Zinc Co., 160 Front St., New York, N. Y. 16 pages. A review of the present practice of imparting fire resistance to various materials, with emphasis on the combination of fire resistance and resistance to mildew, weathering, water, and other solubilizing agents is given in this booklet. The general physical and chemical properties of zinc borate, including statements on toxicity and compatibility are presented. It is stated that there is considerable experimental evidence to indicate that the fire-retardant action of Zinc Borate-3167 is catalytic rather than mechanical. The material is said to impart increased fire-retardant properties to Neoprene GN and to have a mild effect on GR-S. It has a definite plasticizing action on neoprene, but again its effect on GR-S is slight. A table on the reenforcing properties of zinc borates in Neoprene GN is included.

"Perbunan-Buna S Blends." Stanco Distributors, Inc., 26 Broadway, New York, N. Y. Tentative Supplement No. 1 to Section V of Perbunan Manual. 21 pages. This bulletin gives the results of tests on blends of Perbunan and 10, 20, and 30 parts of Buna S (GR-S) and also includes results on blends containing 6, 20, and 30 parts of GR-S to which 20 parts of four different plasticizers were added. The data presented in this supplement are intended to furnish the compounder with fundamental information which can be used in designing formulations to meet recently issued aeronautical and automotive specifications where the volume increase requirements in high aniline point lubricating oils are higher than can be obtained with Perbunan compounds. Tensile, elongation, hardness, air oven aging, and compression set data are given together with volume change and tensile properties after immersion in the various test fluids. Low temperature flexibility results by the "Thiokol" bend test are also included.

"Statex 93." Binney & Smith Co., 41 E. 42nd St., New York, N. Y. Bulletin No. 130. 2 pages. This bulletin explains in a general way the properties of Statex 93, a high modulus furnace carbon black (HMF) recommended for use in GR-S treads, particularly for large-size tires. It is compared with Statex B (FF) and Furnex (SRF) as to surface area, modulus at 300%, tensile, elongation, and rebound at a 50% loading in GR-S. Statex 93 is recommended for compounds requiring any or all of the following characteristics: (1) good reenforcement-abrasion resistance, (2) firmness, (3) high resilience-low heat build-up, and (4) good processing.

"Recent Data on GR-S Frictions and Skims for General Mechanical Goods." Thiokol Corp., Trenton, N. J. Technical Service Bulletin #17. 5 pages. A formula is given for a GR-S friction and a GR-S skim compound both containing Galex, and detailed mixing instructions for either the Banbury or on open mills are included. Calender procedure and roll temperatures are provided, and physical properties of the cured stock listed. It is stated that the formulae and methods have been given thorough factory trial and have been found to be generally satisfactory.

"Characteristics of Wild Rubbers." G. R. Tristram, G. Gee, L. R. G. Treloar, and G. A. Jeffrey. The British Rubber Producers' Research Association, 19 Fenchurch St., London, E.C.3., England. Publication No. 34. 4 pages. A brief examination of five wild African rubbers in comparison with *Hevea* and Malayan *Ficus elastica* is reported. It is stated that the rubbers examined are without exception polyisoprene rubbers, identical in their chemical constitution, and, when purified, similar in physical characteristics to *Hevea* rubber.

"Manufacturers' Standard Warranty and Interpretation." The Rubber Manufacturers Association, 444 Madison Ave., New York, N. Y. 4 pages. The new manufacturers' standard warranty adopted by the tire industry to include tires and tubes being made of synthetic rubber is given and explained in this announcement. Addressed to dealers, it gives details and routine to handle claims.

"Carbothermic Magnesia—Its Behavior and Use in Neoprene Compounds." The Permanente Metals Corp., Latham Square Bldg., Oakland 12, Calif. 16 pages. As indicated in the foreword, the principal purpose of this booklet is to record findings which revealed that carbothermic magnesia can impart characteristics to neoprene as good as, or better, than most of the standard neoprene grades of extra-light magnesium oxide, and to illustrate some of the unique properties imparted to neoprene by carbothermic magnesia. It is stated that the latter is made by converting magnesium oxide to metallic magnesium in the presence of carbon in an electric furnace at 2000°C., followed by back-reaction to magnesium oxide. Data given include a typical analysis of this magnesia, its hydration rate and tensile strength, plasticity, elongation, hardness, set, modulus, tear resistance, aging, etc. of neoprene stocks containing carbothermic magnesia in comparison with commercial extra-light-calcined magnesia. Compound formulae used are given.

"GR-S Solvent Cements with Bondogen." R. T. Vanderbilt Co., 230 Park Avenue, New York, N. Y. 8 pages. This report gives results on pure gum and compounded brushing cements containing low solids, and a spreader dough containing high solids made with and without Bondogen and tested for viscosity. The addition of a small amount of Bondogen to the solvent is shown to lower greatly the viscosity of a GR-S pure gum cement, producing good brushing consistency starting with unbroken GR-S, and churning time is also reduced. This material, moreover, permits higher solids for equal viscosity, or lower viscosity for equal solids, minimizes viscosity increase, and retards gelling during storage, according to this report.

"Accident Facts." 1943 Edition. National Safety Council, Inc., 20 N. Wacker Dr., Chicago, Ill. 96 pages. **"Facts about Synthetic Rubber."** New York Belting & Packing Co., 1 Market St., Passaic, N. J. 32 pages. **"Office of War Information Report on Employment of Disabled Veterans."** Office of War Information, Washington, D. C. 10 pages. **"Pyrometer Accessory Manual."** Bristol Co., Waterbury 91, Conn. 36 pages. **"Basketball for Coaches and Players."** United States Rubber Co., 1230 Sixth Ave., New York 20, N. Y. 24 pages.

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Market Reviews

COTTON & FABRICS

NEW YORK COTTON EXCHANGE WEEK-END CLOSING PRICES

Futures	Nov. 27	Dec. 25	Jan. 1	Jan. 8	Jan. 15	Jan. 22
Feb.	....	19.66	19.84	19.93	19.88	20.26
Mar.	19.30	19.68	19.79	19.97	19.91	20.29
July	18.87	19.17	19.17	19.47	19.34	19.67
Oct.	18.57	18.83	18.83	19.09	18.96	19.12
Dec.	....	18.73	18.71	18.99	18.82	18.98

JANUARY'S market tone was one of nervously apathetic fluctuation. Daily accelerated liquidation, profit-taking, and scattered hedge-selling constantly neutralized gains, revealing continued uncertainty over Congressional attitude toward the subsidy question and the possibility of an early peace. Prices tended upward, especially toward the end of the month, upon news of intended Lend-Lease purchases, notably that of *322,000* bales on the open market by the Food Distribution Administration.

The price of $\frac{15}{16}$-inch spot middling cotton, which closed at *20.52¢* on December 31, fluctuated, but with a fairly steady climb toward the end of the month, between 20.45¢ on January 4 and 21.13¢ on February 1.

The Commodity Credit Corp. reported January 14 that loans were made through January 8, 1944, on 2,886,536 bales of 1943 crop cotton, as contrasted with 1,885,187 bales to January 9, 1943, on the '42 crop.

Fabrics

Since not enough clarification has been made, in many respects, of General Conservation Order M-317, as amended December 24, the trade will not freely distribute goods affected by the order until the mechanics are wholly established. Although demand continues for all types of sheeting and print cloths in the gray, constructions are not currently being offered until the order, which this month has brought business to its lowest point, is fully understood. Only in high count sheetings were good sales reported.

In the rainwear section it was claimed that no provision had been made to furnish cloth to serve converters' and manufacturers' requirements. Various manufacturers promised to be content with carded goods of various kinds of rainwear.

The formerly scarce wide and heavy numbered duck became a trifle freer in supply. Because military uses for the numbered duck are so important, the desired 54-inch is being made by splitting 108-inch goods through the center. Efforts were made to find scarcer styles of numbered duck.

Additional spinerets were taken out of standard yarn production and used for making rayon tire cord.

Amyloform Extender and Filler

AMYLOFORM is a new formaldehyde-carbohydrate condensation product with distinctive new properties not possessed by materials previously known and is available at a comparatively low price. It is a finely divided soft white organic powder with a particle size of 0.001-centimeter average diameter. As a strong preservative, it inhibits fermentation, mold growth, and decay. It has an odor of formaldehyde, but this can be eliminated if desired. It is unusually inert for a soft organic material, and its resistance to change compares favorably or exceeds the more durable resins. Amyloform will not support combustion and will not decompose below 350° C. The mineral matter content is 0.5% or less, and the pH is about 7.

This unusual material suggests possibilities as a filler and extender for cements, putties, adhesives, enamels, paints, explosives, insecticides, preservatives, polishes, molded plastics, as a reenforcing agent for natural and synthetic rubber, and as an adsorption base for extending colors.

Cold or boiling solutions of either weak or strong alkalies are said to have little effect, but concentrated cold and dilute hot solutions of strong acids cause gelatinization and decomposition. There is no effect from organic solvents, and solutions of corrosive salts. Perkins Glue Co.

Rims Approved and Branded by The Tire & Rim Assn., Inc.

Rim Size	Dec., 1943
15" & 16" D. C. Passenger	
16x4.00E	47,437
16x4.50E	8,692
16x5.00F	4,964
16x5.50F	2,071
16x6.00F	4,712
18x5.50F	2,442
15x6½L	31
17" & Over Passenger	
18x2.15B	12,165
Military	
16x4.50CE	92,047
16x6.50CS	78,192
20x4.50CR	1,143
20x6.00CT	20,816
18x8.00CV	10,481
Flat Base Truck	
20x3.75P (5")	4,968
20x4.33R (6")	32,219
15x5.00S (7")	3,632
20x5.00S (7")	300,917
24x5.00S (7")	1,208
20x6.00T (8")	43,111
22x6.00T (8")	2,461
24x6.00T (8")	197
20x7.33V (9 10")	29,663
22x7.33V (9 10")	479
24x7.33V (9 10")	2,646
20x8.37V (11")	843
Semi D. C. Truck	
16x5.50F	2,146
Tractor & Implement	
12x2.50C	363
12x3.00D	11,198
15x3.00D	13,808
16x3.00D	990
19x3.00D	6,894
20x8.00T	670
24x8.00T	3,197
28x8.00T	309
32x8.00T	957
36x8.00T	717
W8-38	1,359
W9-38	1,565
W11-26	584
DW9-38	13,725
DW10-38	1,776
DW12-30	1,028
Cast	
24x15.00	27
TOTAL	768,850

Fixed Government Prices*

Balata	Price per Pound: Civilian Use	Price per Pound: Other Than Civilian Use
Manaos Block	$0.38¾	$0.38¾
Swinam Sheet	.42½	.42½
Guayule		
Guayule (*carload lots*)	.17½	.31
Latex		
Normal (*tank car lots*)	.26	.43½
Creamed (*tank car lots*)	.26¾	.44¼
Centrifuged (*tank car lots*)	.27¾	.45¼
Heat-Concentrated (*carload drums*)	.29½	.47
Plantation Grades		
No. 1X Ribbed Smoked Sheets	.22½	.40
1X Thin Pale Latex Crepe	.22½	.40
2 Thick Pale Latex Crepe	.22	.39½
1X Brown Crepe	.21⅜	.38⅞
2X Brown Crepe	.21⅛	.38⅝
2 Remilled Blankets (Amber)	.21¼	.38¾
3 Remilled Blankets (Amber)	.21⅛	.38⅝
Rolled Brown	.18	.35½
Synthetic Rubber		
GR-M (Neoprene GN)	.27½	.45
GR-S (Buna S)	.18½	.36
GR-I (Butyl)	.15½	.33
Wild Rubber		
Upriver Coarse (crude)	.12⅝	.26⅛
(washed and dried)	.20¼	.37¾
Islands Fine (crude)	.14⅝	.28¼
(washed and dried)	.22½	.40
Caucho Ball (crude)	.11⅝	.24¾
(washed and dried)	.19½	.37
Mangabiera (crude)	.08½	.19¾
(washed and dried)	.18	.35½

*For a complete list of all grades of all rubbers, including crude, balata, guayule, synthetic, and latex, see Rubber Reserve Co. Circular 17, p. 169, May, 1943, issue.

Scrap Rubber Ceilings

Inner Tubes†	¢ per Lb.
No. 2 passenger tubes	7¾
Red passenger tubes	7½
Passenger tubes	6
Tires‡	**$ per Short Ton**
Mixed passenger tires	20.00
Beadless passenger tires	26.00
Solid tires	36.00
Peelings†	
No. 1 peelings	47.50
No. 2 peelings	47.50
No. 1 light colored (zinc) carcass	52.50
Miscellaneous Items#	
Air brake hose	25.00
Miscellaneous hose	17.00
Rubber boots and shoes	33.00
Black mechanical scrap above 1.15 sp. gr.	20.00
General household and industrial scrap	15.00

† All consuming centers except Los Angeles.
‡ Akron only.
# All consuming centers.

Reclaimed Rubber Prices

Auto Tire	Sp. Grav.	¢ per Lb.
Black Select	1.16–1.18	6½/ 6¾
Acid	1.18–1.22	7½/ 7¾
Shoe		
Standard	1.56–1.60	7 / 7¼
Tubes		
Black	1.14–1.26	11¼/11½
Gray	1.15–1.26	12½/13¼
Red	1.15–1.32	12 /12¼
Miscellaneous		
Mechanical blends	1.25–1.50	4½/ 5½
White	1.35–1.50	13½/14½

The above list includes those items or classes only that determine the price bases of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

CLASSIFIED ADVERTISEMENTS

ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

GENERAL RATES	SITUATIONS WANTED RATES	SITUATIONS OPEN RATES
Light face type $1.00 per line (ten words)	Light face type 40c per line (ten words)	Light face type 75c per line (ten words)
Bold face type $1.25 per line (eight words)	Bold face type 55c per line (eight words)	Bold face type $1.00 per line (eight words)
Allow nine words for keyed address.	**Address All Replies to New York Office at 386 Fourth Avenue, New York 16, N. Y.**	*Replies forwarded without charge*

SITUATIONS WANTED

COMPOUNDER-ENGINEER. EXPERIENCED IN COMPOUNDING and manufacture of mechanicals, tubes, pneumatic and solid tires, natural and synthetic rubber. Trained in production management by large company. Chemical Engineering Degree. California location desired because of children's health. Address Box No. 748, care of INDIA RUBBER WORLD.

RUBBER CHEMICAL ENGINEER, WITH BROAD background in all types of mechanical rubber goods, including all types of synthetics, seeks connection with progressive company in charge of development. Address Box No. 751, care of INDIA RUBBER WORLD.

RUBBER TECHNOLOGIST WITH 20 YEARS' EXPERIENCE IN compounding, testing, development, research, and control of rubber and rubber chemicals. Some knowledge of plastics. Seeks responsible position with postwar prospects. Address Box No. 752, care of INDIA RUBBER WORLD.

RUBBER CHEMIST. EXPERIENCED IN COMPOUNDING tires, tubes, tire repair materials, patches, camelback, and mechanical goods, made of natural or synthetic rubbers. Experienced in factory processing and production. Draft exempt. College graduate. Address Box No. 757, care of INDIA RUBBER WORLD.

LATEX CHEMIST. ORGANIC RESEARCH EXPERIENCE. PH.D. Last five years in charge of rubber latex department, natural and neoprene: formulation, compounding, production (dipping). Address Box No. 762, care of INDIA RUBBER WORLD.

SITUATIONS OPEN

TIRE AND TUBE DEVELOPMENT, PROCESS, CONSTRUCTION and production engineers—Location, Pennsylvania. Address Box No. 745, care of INDIA RUBBER WORLD.

TIME STUDY AND MOTION ANALYSIS MEN—must have several years' experience with progressive company. Furnish complete history in first letter. Location away from Ohio. Address Box No. 746, care of INDIA RUBBER WORLD.

WANTED: CHEMIST, EXPERIENCED IN ALL phases of compounding molded rubber goods. Knowledge of synthetic and plastic compounding preferred, but not necessary. Eastern concern. Excellent opportunity. Address Box No. 749, care of INDIA RUBBER WORLD.

CHEMIST AND PRODUCTION SUPERVISOR WANTED TO TAKE complete charge of small well-established rubber company located in the East. Must be familiar with processing and molding of crude and synthetic rubber. Good salary and opportunity for the right party. Address Box No. 750, care of INDIA RUBBER WORLD.

WANTED BY ONE OF THE SMALLER RUBBER FACTORIES IN Ohio a Tube room department head. This is a permanent position with good future opportunities. Prefer man with educational background and tube room experience. Address Box No. 754, care of INDIA RUBBER WORLD.

PLANT ENGINEER

Small rubber manufacturing company, located fifty miles from Indianapolis, Indiana, desires the services on a permanent basis of a Mechanical Engineer to take full responsibility for maintenance and upkeep of machinery and equipment. Applicant should have had a few years of practical experience in industry, not necessarily rubber. Excellent salary to start. Reply by letter giving full particulars to Box No. 758, care of INDIA RUBBER WORLD.

SITUATIONS OPEN (Continued)

ARE YOU THE MAN?

Somewhere in the Rubber Industry, there is an individual whose experience and knowledge of Industrial Rubber Products makes him qualified as a Branch Sales Manager.

If you are the man, state your reasons why one of the most progressive Rubber Manufacturing Companies in the United States should grant you an interview, which can be arranged to be held at a convenient location.

There is a genuine opportunity that will develop into a real he-man's job when peace returns. All replies confidential.

Address Box No. 759, care of INDIA RUBBER WORLD

AN OHIO RUBBER MANUFACTURING COMPANY HAS AN opening for a Tire room department head. This is a permanent position and one with excellent opportunities for the future.. Prefer man with experience in tire building and with some educational background. Address Box No. 755, care of INDIA RUBBER WORLD.

AN OHIO RUBBER MANUFACTURING COMPANY HAS OPENING for one or two experienced time-study engineers. Experience need not be in rubber, but this would be beneficial. Good opportunity for the right men. Address Box No. 756, care of INDIA RUBBER WORLD.

CHEMIST AND FACTORY SUPERINTENDENT TO take charge of Small Rubber Factory in Chicago Area. Excellent opportunity. Address Box No. 760, care of INDIA RUBBER WORLD.

WANTED: GRADUATE CHEMIST

with some experience in rubber. Able to prepare reports and bulletins. 30-35 years old. Deferred. Position near New York. Give details, education, experience, salary required, etc.

Address Box No. 743, Care of INDIA RUBBER WORLD

(*Classified Advertisements Continued on Page 526*)

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Operating, Globe, Angle, or Check Valves—Hydraulic Presses, Accumulators, Pumps, etc. —For almost any size or pressure.

Dunning & Boschert Press Co., Inc.
336 W. WATER ST. SYRACUSE, N. Y.

Classified Advertisements

Address All Replies to New York Office at 386 Fourth Avenue, New York 16, N. Y.

Continued

MACHINERY AND SUPPLIES FOR SALE

FOR SALE: 6—12x13" Hydraulic Presses, 50 Ton; 3—24x24" Hydraulic Presses, 100 to 150 tons; 1—15x18" Hydraulic Press, 200-Ton, Hobing Press; 1—18x38" Farrel-Birmingham 3-roll Calender; 1—16x42" Calender, 3-roll, with drive and motor; 1—20x60" 3-roll Calender, herringbone drive; 1—Allen #3 Tuber; 1—Watson-Stillman Hydro-Pneumatic Accumulator, 5½" ram, 48" stroke, 3000# pressure; W. & P. Mixers; Dry Mixers; Pulverizers; Grinders, etc. Send for complete list. CONSOLIDATED PRODUCTS CO., INC., 13-16 Park Row, New York 7, N. Y.

ONE USED HYDRAULIC PUMP, COMPLETE WITH RETURN tank, counter shafting, motor and switch. No priority required. $250.00 f.o.b. California. Address Box No. 744, care of INDIA RUBBER WORLD.

FOR SALE: 1-WATSON-STILLMAN HYDRO-PNEUMATIC ACCUMulator, 25" x 7" x 48", Capacity 8 GPS, 2550# Hydraulic WP, Complete with 36" x 20' Steel Air Tank, Trip Control, By-Pass Valve, Interconnecting Piping and Fittings, and Southwark Triplex Vertical Hydraulic Pump, 1½" x 6", 11.5 GPM, 2500# WP, Connected to Westinghouse 15 HP Slip Ring Motor with Starter. 2—Deane Steam Pump Company Triplex Vertical Hydraulic Pumps, 6" x 8", 200 GPM, 200# WP, Arr. for Geared M.D. 1—Boomer and Boschert Triplex Vertical Hydraulic Pump, ⅞" x 4", 3 GPM, 4000# WP. 3—New Single Opening 50-Ton Hydraulic Presses, 12" x 12" Platens, Any Desired Daylight, 8" Diameter x 8" Stroke Rams. 1—Southwark, 150-Ton, 2-Opening Hydraulic Press, 24" x 24" Steel Steam Platens, 4" Daylight Per Opening, 12" Diameter x 12" Stroke Ram. 1—Royle #1 Tuber, arranged for Motor Drive. 1—Hydraulic Plastics Sheeter, Capacity 24" x 6' Sheets. 1—8 Opening Hydraulic Press, 30" x 52" x 2" Steel Platens, 3" Openings, 2—14" Diameter x 23" Stroke Outside Packed Rams, 2500# WP, Complete with 4-Plunger Vertical Hydraulic Pump with 15 HP A.C. Motor, and All Other Operating Accessories. All Offered Reconditioned, Guaranteed, Prompt Shipment. Drawings and Other Data on Request. Other Sizes of Presses, Pumps, Accumulators, also Motors, Compressors, Boilers, Machine Tools, etc. INDUSTRIAL EQUIPMENT COMPANY, 870 Broad Street, Newark (2), New Jersey.

1—6" ALLEN TUBER COMPLETE WITH HEAD, DRIVE, 50 H.P. slip-ring motor and controls. 1—24"x12" Rubber Mill complete with drive and motor. 1—Experimental Mill 14"x8" less drive and motor. 2—36"x15" Rubber Mills complete with drive, 75 H.P. motor and controls. 1—54"x18" Rubber Mill complete with herringbone drive and 75 H.P. motor. Address Box No. 763, care of INDIA RUBBER WORLD.

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and pipe make the ideal steam connection for platen presses

FLEXO SUPPLY COMPANY, 4218 Olive Street, St. Louis

GUARANTEED REBUILT MACHINERY

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UNITED

UNITED RUBBER MACHINERY EXCHANGE

319-323 FRELINGHUYSEN AVE. CABLE "URME" NEWARK, N J

(Classified Advertisements Continued on Page 528)

Classified Advertisements

Continued

MACHINERY AND SUPPLIES WANTED

1—#3 ROYLE TUBING MACHINE; 1—LABORATORY-size rubber mill; 1—48" or 60" mixing mill, complete with gear reduction unit. Address Box No. 747, care of INDIA RUBBER WORLD.

WANTED: EQUIPMENT FOR PLASTIC MOLDING PLANT, INcluding Mills, Toggle Presses, Hydraulic Presses, Pumps, Rotary Cutters, Pre-Form Machines, Vacuum Shelf Driers. Send full details and prices. Address Box No. 753, care of INDIA RUBBER WORLD.

WANTED: HYDRAULIC PRESSES WITH HEATED PLATENS, 150 tons and up, also Banbury Mixer, Vulcanizer at least 5' diameter, and other good equipment wanted for expansion program. Address Box No. 764, care of INDIA RUBBER WORLD.

PLANTS WANTED

WANT TO BUY SMALL RUBBER PLANT MANUfacturing patented articles. New York or New England area. Address Box No. 761, care of INDIA RUBBER WORLD.

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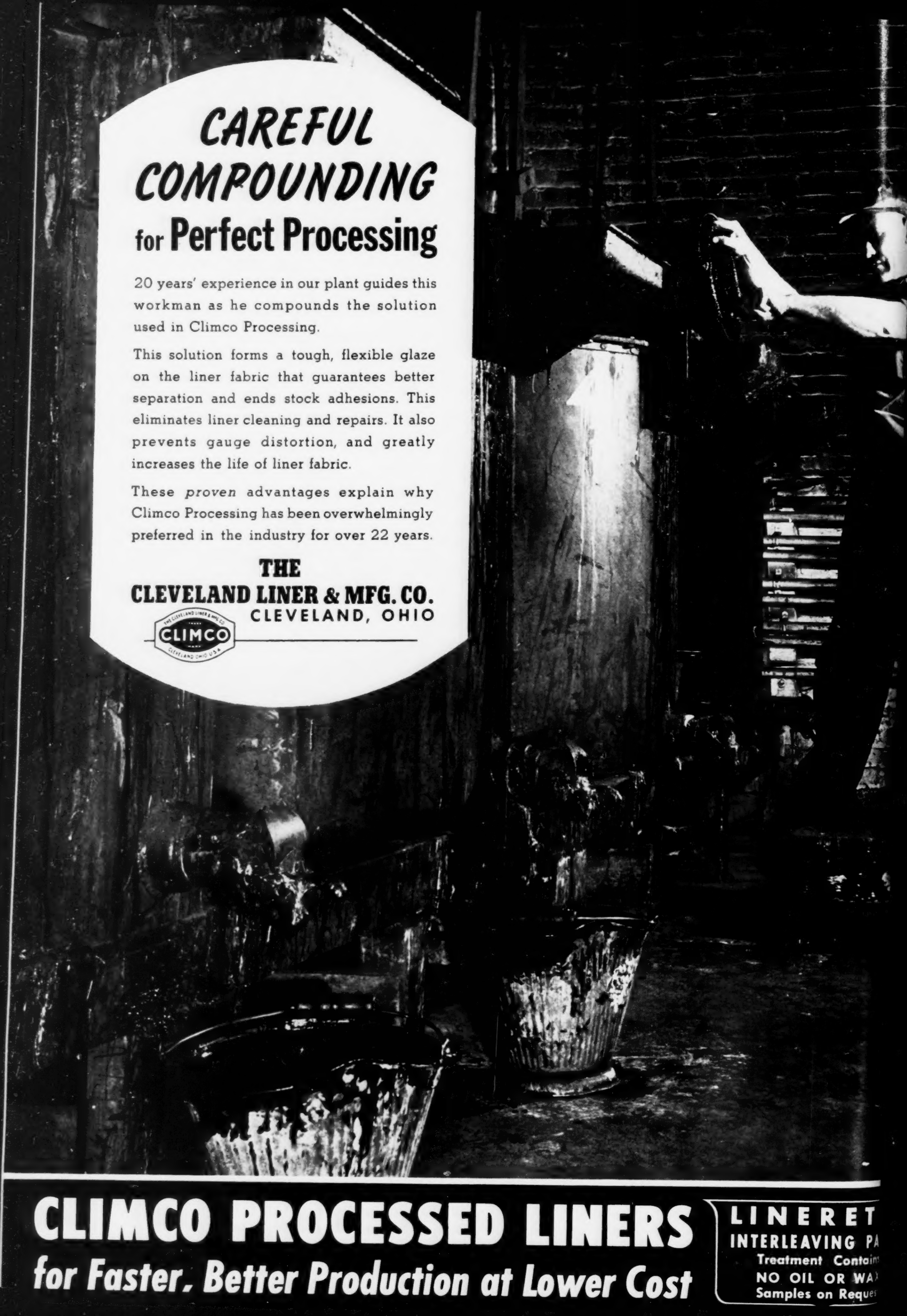

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20 years' experience in our plant guides this workman as he compounds the solution used in Climco Processing.
This solution forms a tough, flexible glaze on the liner fabric that guarantees better separation and ends stock adhesions. This eliminates liner cleaning and repairs. It also prevents gauge distortion, and greatly increases the life of liner fabric.
These *proven* advantages explain why Climco Processing has been overwhelmingly preferred in the industry for over 22 years.
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